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RAQUEL CATALINA VAQUERO
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DESIGN AND EVALUATION OF A MOBILE FITNESS
APPLICATION TO ENCOURAGE PEOPLE IN PHYSICAL ACTIVITY

Master of Science thesis

Examiners: Dr. Thomas Olsson and Dr.
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ABSTRACT

RAQUEL CATALINA VAQUERO & RODOLFO MORALES LÓPEZ: Design and evaluation of a mobile fitness application to encourage people in physical activity.

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Mobile fitness applications have seen a significant growth to promote more active lifestyles by following different approaches. However, it is yet unclear which design strategies and methodologies provide the best results when it comes to keep people motivated in their workouts.

The main objective of this study was to determine what motivational factors engage people to use fitness and wellbeing mobile applications. For this purpose, a mobile application was designed for the company SportyFly Oy. *SportyPlanner app* is a mobile application that allows users to follow up exercise programs and to easily communicate with their personal trainers. In order to determine whether the application would motivate its users as well as the user experience provided, an evaluation with 16 participants was performed. In addition, an evaluation of the design strategies used in the design of *SportyPlanner app* was made. Therefore, the final product served as a mean to validate what design strategies are more suitable to increase user's physical activity and motivation.

The most important findings regarding motivation were that having the support of a personal trainer is an essential feature to be included and that promoting sociability and the creation of users' communities is very motivating in the long term. Also, providing an extrinsic motivation in the form of rewarding the user turned out to be a good motivational tactic. As for the usability, the intuitiveness and ease of use of the app as well as the visual design were features highly appreciated by the participants.

PREFACE

Studying and living in Finland was a decision I made several years ago even before finishing my Bachelor's degree. As my Bachelor's thesis was usability related, I started to get more and more interested in User Experience and Human-Computer Interaction and that is why I decided to apply to this Master's programme.

Writing this thesis was an enriching process that has helped me to hugely expand my knowledge. This process could not have been achieved without the help and advice of many people and therefore, firstly I would like to thank my partner and friend during in this journey which has been this thesis, Rodolfo Morales López. Also, a big thank you to the supervisors Thomas Olsson and Aino Ahtinen for their guidance, support, advice and for sharing their knowledge with me. Second, I would like to thank all the SportyFly OY. members for their time and cooperation in this research. Finally, I am very grateful to the participants who took part in the usability tests and interviews for providing us such valuable feedback.

Finally, I would like to thank my family and friends for their infinite support and encouragement. A big thank you goes to my sister; life in Finland would not be as great as it is without you!

Tampere, 7th of August 2016

Raquel Catalina Vaquero

I applied to the master degree program in User Experience at Tampere University of Technology because I enjoy combining the previous knowledge I had from the bachelor in mechatronics engineering and industrial design. I think the field of Human Technology Interaction allows to have a broader view when creating a new product or service in today's digital world.

Working on this thesis has meant to learn new people and new things along the way. I would like to thank my co-worker in this thesis Raquel Catalina Vaquero because she was comprehensive and supportive with my way of working. Also thank the supervisors Thomas Olsson and Aino Ahtinen for all their support and enthusiasm from the beginning. Likewise, I want to thank the company SportyPlanner Oy and their members for all their help provided. Finally, I thank all the participants who kindly helped us to conduct the user tests and their valuable feedback.

I also want to thank my family back in Mexico for all their unconditional support.

Tampere, 7th of August 2016

Rodolfo Morales

DIVISION OF WORK

The division of work presented below comprehends the sections written by specific members of the team. However, the empirical work of designing and evaluating the SportyPlanner mobile app carried out for this thesis has been done conjointly by Raquel and Rodolfo. The reason for this is that having both members involved in the design of the app assured a better result. Also, conducting the interviews with one person asking the questions and the other one taking notes is easier and has better chances of not missing any information the interviewee is sharing. Another reason for this is that both members wanted to practice interviewing people, which is a skill highly appreciated as UX designer in the work environment.

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LIST OF SYMBOLS AND ABBREVIATIONS

App	application
CEO	Chief Executive Officer
CC license	Creative Commons license
gym	gymnasium
HCI	Human-Computer Interaction
i.e.	Latin id est, that is
iOS	iPhone Operating System
ISO	International Standard Organization
KEG	Kaleidoscope of Effective Gamification
Oy.	Osakeyhtiö, limited company
PT	Personal trainer
SDT	Self-Determination Theory
TUT	Tampere University of Technology
UCD	User-Centered Design
UED	User Environment Design
UI	User Interface
UID	User Interface Design
URL	Uniform Resource Locator
UX	User experience

1. INTRODUCTION

The work of this thesis focused on designing and evaluating an iOS mobile application called SportyPlanner app, which contains workout programs for people to follow up on their own and with the assistance of personal trainers. The project was done in collaboration with the company SportyFly Oy, a Tampere-based fitness and well-being services startup.

This chapter describes the background of the topic of the thesis and introduces the research questions and objectives. After that, there is the product brief and finally how the thesis is structured.

1.1. Background

Nowadays, research about what could be the best design techniques and strategies when designing mobile fitness applications so that these applications motivate people to continue using them and thus, to continue exercising and being active has been done (Ahtinen, 2015; Kappen et al., 2016; Stawarz et al., 2015; Yoganathan et al., 2015). There is not one unique design technique or strategy that ensures people will use any given application. However, conceptualizing SportyPlanner app under user experience methods represents a way to validate how effective the design strategies followed in this project are and if they actually help to increase the end user's physical activity.

In the current situation, the company SportyFly Oy mentioned that the communication between the personal trainer and the end users is done by email. Also, end users cannot track their own progress in an intuitive manner and it takes them more effort and time to keep a personal agenda. Emphasis was put on the creation of a new product for the company and validate it according to the technical requirements and the feedback from end users, personal trainers and supervisors of the thesis. There was no implementation on the project, however, several interactive prototypes were made and refined during several months in order to meet the client specifications. These prototypes also allowed for exploration different visual layouts and configurations, as well as for conducting usability tests of the system in order to design a product which is ready to be coded and launched to the market.

Part of the enthusiasm to select this this topic was the previous experience in working with SportyFly in one of the courses of the master degree. It permitted the effective cooperation between the students and the company, furthermore it gave a common starting point which is always beneficial for all the stakeholders of project. It also represented an opportunity to work on a project that is directly related with a real product.

1.2. Research objectives

The main objective of this project was to design an application that keeps the end user engaged and motivated to being physically active by promoting healthy habits. Most of the research efforts concentrated around making quick iterations of how to provide a rich user experience for the end users to keep them using the application. From the beginning, part of the focus was to design the concept of a system with great usability that is easy to learn and allows end users to complete their tasks with ease. Moreover, having the users involved is an important aspect for the company since in the near future they want to broaden their market and the mobile app is one of the products they want to introduce.

The research questions of the thesis are the following:

- *What motivational factors engage people to use fitness and wellbeing mobile applications?*
 - *What motivational factors apply to SportyPlanner in particular?*
- *Which design strategies have been used in the design of SportyPlanner app so that it motivates its users to continue exercising?*

The first question refers to the general aspects that people perceive to be motivational and help them to continue having the desire of using fitness applications when exercising. The sub-question relates to the first one but applies to SportyPlanner app in particular.

The second question address the particular design strategies that have been used when designing SportyPlanner app. In order to do so, design strategies proposed by Ahtinen (2015) have been analyzed, evaluated and some of them included in the design process of the application designed for this thesis work. Included design strategies have been selected based on the company requirements and researchers' perceptions. After that, they have been contrasted with users' opinions during the usability tests and interviews which have been done for the evaluation of the design.

1.3. Product brief

The customer of this project was SportyFly Oy, a company specialized for offering exercise and wellness services. The primary contact person was Kati Ahonen, CEO of SportyFly. The project topic was generated by the master degree students Raquel Catalina Vaquero and Rodolfo Morales.

The initial set of features that the app should contain changed along the design process of the app and in the end it had many features. Likewise, in the initial scenario there was no way for end users to provide feedback to the personal trainer other than through email or face to face.

The product in focus is called SportyPlanner mobile app, an iOS mobile app that allows users to follow up exercise programs and be in communication with personal trainers. Any person suitable of going to the gym or working out outdoors with knowledge of smartphones is a potential user of this app. The users can view their personalized plans with detailed movement information, or use some of the ready-made plans to get started with exercising. The possibility to track the exercises in the app is one of the main features, however, there are many other features that make SportyPlanner mobile app a rich experience for the user. Among the features are the direct chat between users and personal trainers, the calendar to keep track of completed and missed trainings, among many other features which are described in detail in further sections of this thesis.

The product has benefits for SportyFly, as well as both types of users, personal trainers and end users. End users benefit by getting help with exercising in an interactive way. Personal trainers benefit by saving time when providing personalized exercise plans or guidance as well as getting more customers. SportyFly benefits by getting monthly license fees from the users of the website, and by selling premade plans to users. Figure 1 presents screenshots of SportyPlanner.

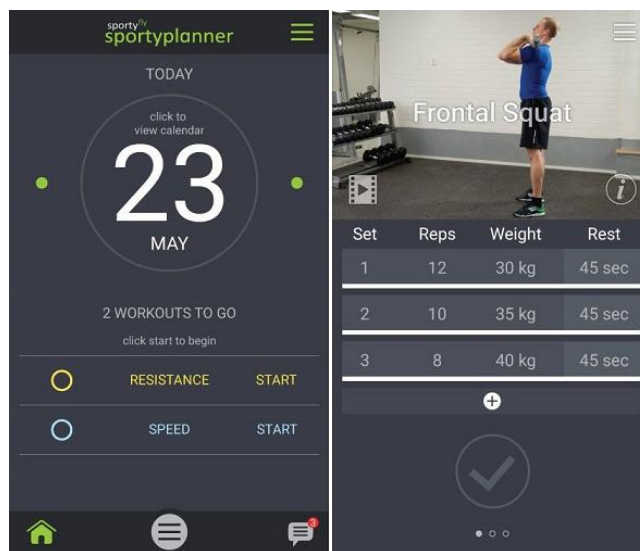


Figure 1. Home screen and Workout screen.

1.4. Structure of the thesis

The thesis is divided into six chapters. Its structure is presented in Figure 2.

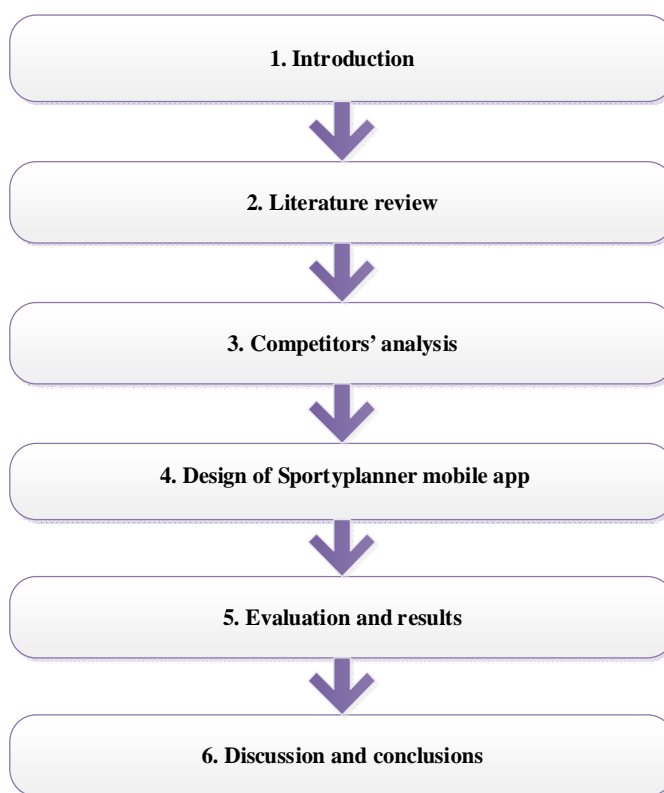


Figure 2. Structure of the thesis.

The first chapter of the study introduces the topic and presents the research objectives. In addition, a brief description of the product that has been designed as well as the structure of the thesis is included.

Chapter two contains the literature review which is divided into three subsections. In the first two subsections, the basics of user experience as well as user experience related to fitness and wellbeing applications is provided. Moreover, 20 fitness applications that already exist have been selected in order to evaluate them in terms of motivational factors as well as usability. Those 20 fitness applications are presented and briefly described in the third subsection.

Chapter three presents a competitors' analysis. This section is divided into three subsections. First and second subsections present the basics of the motivational factors and usability heuristics that have been used to evaluate the existing applications. Third subsection presents the evaluation of the 20 selected applications. In this evaluation, both, motivational factors and usability problems have been studied so that the problems found can be overcome in the design of SportyPlanner app.

In chapter four the actual design of SportyPlanner app is explained. This section contains all the details of the design process such as functionalities and navigation as well as detailed views of the system.

Chapter five presents the results of the evaluation of SportyPlanner app with real users as well as an evaluation of the design strategies used to design the application. This chapter is divided into four subsections. First, an analysis of some of the recent models which comprise design strategies in order to support physical exercise has been done. After that, one of the models has been selected in order to compare the proposed design strategies with the ones that have been used in the design of SportyPlanner app. In addition, a proposal of new design strategies that have not been considered in the aforementioned model has been developed. Second, the evaluation methods that has been used to evaluate the prototype are explained. Third, the type of users as well as the contexts of use that have been presented during the evaluation are described. Finally, the results of the evaluation are described.

Finally, chapter six presents the conclusions as well as the possible future work that could be made after this study.

2. LITERATURE REVIEW

This section covers main concepts related to user experience, user-centered design, usability and user experience methods; as well as how user experience is related to motivation in fitness mobile applications. All of these are core concepts in this project and therefore should be covered to have a common starting ground.

2.1. Basics of User Experience

2.1.1. Definition of UX

User Experience (UX) is a term gaining popularity in many fields related to Human-Computer Interaction (HCI), however it that lacks a definition universally accepted (Mirnig et al., 2015). In order to show the variety with which some authors have approached the topic, a few commonly used definitions of UX are presented.

Probably the most referred definition of UX up to this date was made by the International Organization for Standardization (ISO) and released in ISO 9241-210:2010 Ergonomics of Human-System Interaction—Part 210: Human-Centered Design for Interactive Systems. This definition states that UX is “*a person’s perceptions and responses resulting from the use and/or anticipated use of a product, system or service.*” The ISO tried to standardize a definition of UX for general use in the industry (Mirnig et al., 2015). Another definition often recurred was made by Dr. Donald Norman, a scientist who coined the term and was among the first to explain the importance of designing around users and their needs. UX “*encompasses all aspects of the end-user's interaction with the company, its services, and its products*” (Norman, 1993). A different approach which focuses more on the human and subjective aspect of the interaction with a product refers to UX “*as a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service*” (Hassenzahl, 2008). The user becomes a judge before, while and after completing the interaction that can change over time and ends up being a momentary feeling.

UX allows to create the user’s perception of the product or service when interacting with it. These perceptions include effectiveness regarding how good the result is; efficiency while completing the objective of the task, such as how fast or cheap is it; the emotional satisfaction related to how good it feels; and the quality of the relationship created with the product or service associated to what expectations it creates for subsequent interactions (Kuniavsky, 2010). User’s perception of a product can be considered from two points of view or dimensions. The first one determines how the user perceives a product’s ability to complete a task, known as do-goals or pragmatic dimension. The

second one determines what becomes of the user (acquiring new social status or gaining popularity for example) when interacting with a product, fulfilling user needs beyond completing a task, known as be-goals or hedonic dimension (Hassenzahl, 2008). One of the most recent definitions of UX made by Hassenzahl & Tractinsky (2008) refers to it as consequence of a user's internal state, the characteristics defending the product and the context in which the interaction occurs (Hassenzahl & Tractinsky, 2006).

As it can be seen, the term UX has been defined to serve for different purposes, some of them focus more on the scientific perspective while others seem to be more practical and business oriented (Gross & Bongartz, 2012). It is difficult to come up with a definition of what exactly UX is because the term itself is related with concepts that belong to diverse areas such as emotional, affective, experiential, hedonic and aesthetic aspects of an interaction of a human with a product (Law et al., 2009).

The UX design process in the development of a new product or the redesign of an existing one consists usually of the user research, the design itself, testing and implementation (Allabarton, 2016). Achieving good UX is a topic often discussed within the Human-Computer Interaction scientific scene. Rather than designing good experiences, UX designers should opt to design products that have the appropriate characteristics to generate good experiences when users interact with them (Forlizzi & Ford, 2000a). The design process should ideally start by getting to know the users and their context. Otherwise, it is very unlikely that the product will allow the user to complete their goals and provide a pleasant experience while doing so (Macaulay & Busse, 2009).

2.1.2. Definition of UCD

Having the user as the focal point around which design decisions are made is known as User-Centered Design (UCD). ISO defines User-Centered Design as *“the active involvement of users and a clear understanding of user and task requirements; an appropriate allocation of function between users and technology; the iteration of design solutions; multi-disciplinary design”* in the ISO 13407:1999 Human-Centered design processes for interactive systems. This methodology enables that the experience the person is having while interacting with the product will be more efficient, satisfying and user-friendly (Usability First, 2015). The user must be considered at all moments of the design process, from the initial phases to the evaluation and validation of the product with prototypes and early alpha and beta products. Interviews, usability tests, surveys, and other forms of user research conducted before and during design can make the difference between a product and service that is useful, usable, and successful and one that's an unprofitable and frustrating for everyone involved (Goodman et al., 2012). Yet, a successful UX designer will focus not only in the user but in the context around him/her. It is when subjective user experiences are understood that is possible to synthesize them into formalized and concrete characteristics of a product (Forlizzi & Ford, 2000b).

Designing products, including web and mobile applications that have never existed before requires close attention to the social and cultural environment in which these products or interfaces will be used. This means that a UX designer has to be aware of the context and avoid to be limited to the interaction between the product and the user. Therefore, it is essential to perform user research to find out what are the user goals, needs and context under which the users will be interacting with the product (Usability First, 2015).

2.1.3. Definition of Usability

Evaluating the effectiveness and benefits of investing on UX design within a product could be quite difficult because UX deals with the user's emotions. This is why it comes useful to evaluate the usability of a product and have concrete elements onto which make design decisions. The ISO defined usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” in the ISO 9241-210:2010 Ergonomics of Human-System Interaction—Part 210: Human-Centered Design for Interactive Systems. Usability represents the quality of a product which dictates if it is user-friendly, easy to learn and supports user's goals in an engaging way (Usability First, 2015). Usability is a key aspect of the user experience and plays a serious role in experiences that are effective and pleasant. Based on the findings of the usability test, a UX designer can provide suggestions on what changes of the product are needed in order to improve the experience for the user (User Experience Professionals' Association, 2012). Despite all the complexity behind a product, its success still depends on only one thing: how the users understand it. Although a product lacking usability can create a bad user experience, a product with having good usability practices may not succeed at providing a good user experience (Calvillo, 2007). In general, it is a good habit to have an outline of the test which includes all the phases of the test such as the tasks, the place, times, as well as the needed tools to conduct it (Usability.gov, 2015). Then the users must be defined and recruited, which is sometimes is challenging depending on the type of user whom sometimes can belong to a very specific group and therefore difficult to find. Selecting the right user plays a key role because it can determine how useful is the data gathered by the test. After that comes the actual test and finally interpreting all the data gathered as well as following up that the usability suggestions are implemented (Crone, 2015).

2.1.4. Methods of UX

User research is the process in which the main objective is to find out how people interpret and use products and services. In this thesis work individual interviews and prototypes were applied to personal trainers and end users. Nowadays, user research should be applied everywhere: in the design of websites, mobile phones, consumer electronics, medical equipment, banking services, and many other areas (Goodman et al., 2012).

2.1.4.1 User Research

Researching the user can be carried out to obtain valuable information from the users in the way of quantitative data such as user populations, ergonomics and usage patterns, or qualitative data such as user contexts, needs or attitudes. Deciding which method of user research to perform can vary depending on the project, phase in which the project is, the context and of course the industry (Macaulay & Busse, 2009). A good user research often leads to have a product that supports the user's behaviors, intends, beliefs and attitudes (Usability First, 2015). User research methods frequently involve interviewing existing and potential users of a product to achieve insight into what would be the foremost effective design. Commonly, the simplest way to directly get information is by observing and interacting with users. The more the user experience designer knows about the user, the easier it will be to develop experiences that mirror the voice and emotions of the users (Goodman et al., 2012).

Using UX methods allows the researcher to gather up different type of information about users, however every method should have a structure and purpose. Table 1 shows user research methods that are useful to apply before the design phase has started. These methods are particularly useful to get to know the user and to define the concept.

Table 1. Adapted from User Research Basics (Usability.gov, 2015).

Method	Description
Focus Group	Guided discussion with a moderator and a group of users to know about user's attitudes, needs, desires, etc.
Individual Interview	It comprehends the discussion of the interviewer and interviewee. It is possible to get detailed information about the user and expand on specific topics but time consuming.
Persona	It represents the archetype of the user of a product. Ideal to concretize user goals, needs, desires, characteristics, etc.
Survey	It is a questionnaire that can be applied to big samples of users.
Contextual Inquiry	It allows to observe the users while they are using the product in their natural environment.

2.1.4.2 Design

Once information is gathered from the initial user research and consolidated it is possible to create initial designs of the product. The design is guided on the interpretation of what users expect to achieve and the way they want to interact with the product. Consistency

is a vital aspect to craft a pleasurable user experience through the whole interaction. It allows to conjointly make sure that all the parts align with the client's goals as well (Allabarton, 2016). Today, users can interact with a product in a variety of devices. Still, products that have stood out were those that were pleasant to use. Consistency across different devices greatly builds the trust users have in a product (Nielsen Norman Group, 2013).

One tool used constantly in the design phase is wireframes, they consist of two-dimensional illustrations of a page's interface content with the intent of showing the arrangement of the information, functionalities and intended behaviors. Wireframes do not depict visual design and they usually are monochromatic (Usability.gov, 2015). Other methods commonly used in UX design are showed in Table 2.

Table 2. Adapted from User Research Basics (Usability.gov, 2015).

Method	Description
Storyboard	It is a comic that illustrates the actions followed by a user while interacting with a product and the context under which such actions take place.
User Journey Map	It is a diagram that explores the steps taken by a person when they engage with a service. Quite useful to find out user's motivations and needs in each step.
Moodboard	It is a collaborative collection of images and references that serve as the base to create a product's visual style guide.
Sketching	An easy and quick way to visualize of visualizing an interface by using paper and pen. They are extremely useful to validate ideas.

From a realistic point of view, UX designers will not address each particular aspect of a product for every user, this is impossible to achieve. In general, people tend to perceive things in very different ways. What works for one person might not have the same effect on another. Designers should create a design to incite specific experiences and promote certain behaviors, this is how it should work in the real life (Quesenbery & Szuc, 2012).

2.1.4.3 Evaluation

After the initial design has been made, the testing phase starts and the work focuses on judging the product's current state as a whole or breaking it into smaller components. The aim of this stage is to report problems and suggest ways to fix them based on the analysis

of the information provided by the user tests (Tuch et al., 2013). Users can communicate their points of view of interacting with the product by creating stories for example of their experience, showcasing positive and negative aspects. These stories come natural to users because it happens all the time when they share personal experiences in their daily lives and it is particularly good with emotion-arousing details of the interaction with the product (Tuch et al., 2013). The outcome of this type of user research might be to determine the effectiveness and quality of experience of various aspects of a product. They also provide rich and meaningful data on what significant events trigger positive experiences for the user. Unveiling patterns that could lead to improve the consistency of the product and allow the users to find ways of effectively use it to complete a task (Tuch et al., 2013).

Table 3 shows methods that are useful to apply after the initial design has been made. These methods are particularly useful to evaluate, test and refine a design, or in other words, iterative design.

Table 3. Adapted from User Research Basics (Usability.gov, 2015).

Method	Description
Heuristic Evaluation	It is carried out by an expert in usability and consist of evaluating the product based on the 10 usability heuristics of user interface design.
Parallel Design	It is a methodology that consists of having several designers working on the same project at the same time and combining the best aspects of each one to get the best possible solution.
Prototyping	This method consists of creating quick physical representations of a design to test them as soon as possible and get feedback from the users, without having to implement them.
A/B Testing	The idea is to show different versions of the same product to the users and get feedback by comparing the results of which one performs better.
Affinity Diagram	It is a technique to identify and group patterns when the data seems to be unrelated.

2.1.4.4 Implementation

The final phase of the UX design process refers to the implementation and it reflects all the changes made from the previous phases. Ideally a UX designer will exchange dialogues with the developer team of the company to ensure the implementation follows the design guidelines determined by the UX designer. UX designers conjointly verify systems within the main system and processes among a system. However, the role of a

UX designer varies greatly depending on the nature of the company in which he/she is working for (Allabarton, 2016).

2.2. Motivation and Persuasion in User Experience Design for Fitness and Wellbeing Applications

Good UX can motivate users to interact with a website or mobile app (Tuch & Hornbæk, 2015). Motivating users to perform a selected action within an app might be a challenge in most industries, particularly if the app requires the action to be performed repeatedly. To comprehend what motivates users and control their behaviors, it must be understood the mechanisms that guide user's actions by conducting analysis around them (Martin, 2012). Users are motivated to perform an action because of extrinsic and intrinsic factors. Extrinsic means that the user will be driven to do something by external factors which include things that happen around them and determined by the environment such as the place, time of the day, tools, etc. And intrinsic means that the user is motivated by internal factors such as their beliefs, values, goals, etc. (Finnerty et al., 2013)

In a traditional point of view, persuasion is understood as any kind of human communication that is designed to influence the autonomous judgments and actions of people (Simons et al., 2001). Mobile applications communicate information to users and also allow them to communicate among themselves. In this sense, applications can be seen as persuasive systems that allow the reinforcement, change or shape in the behavior of users (Oinas-Kukkonen & Harjumaa, 2008). A helpful framework for identifying what persuades a user and promotes behavior is BJ Fogg's behavior model. This model explains that for a specific behavior to occur, three elements must be present at the same time: motivation, ability and triggers. This model assumes that a behavior is probable to happen if a user feels sufficiently driven to do so, meaning that the person can perform the behavior and is reminded to perform it by a trigger (Martin, 2012). A trigger calls for a specific action. Figure 3 shows Fogg's model and indicates that triggers work by well if the user's levels of motivation and ability are high enough (Fogg, 2015).



Figure 3. Adapted from Fogg Behavior Model (Fogg, 2015).

Mobile applications are recently being used as tools to alter people's behavior and persuade them to participate in more engaging everyday physical activities. The tendency at the moment is taking a fun oriented approach where users can train together and get motivated to have healthier habits. Fitness and wellbeing mobile applications focus on creating relationships among users and providing the support of real personal trainers to make the workout safer and motivating in the long term (Pilloni et al., 2013).

The use of mobile devices in supporting health behavior changes is promising. Smartphones have become recently great prospects for health promotion. Apart from broader opportunities for users to access health data, mobile devices have become helpful for facilitating the continued collection of private information and prompting behavior modification. Specially, there are platforms for developers that expand the practicality and utility of mobile devices. Within the "health and fitness" category in Apple's App Store, developers have created thousands of downloadable apps for Apple's mobile devices. Since the launch of the Apple App Store within the America in July of 2008, quite a lot became very famous and nearly reached twenty-five billion downloads. By 2016, it is calculable that quite forty-four billion apps could be downloaded (West, 2012).

One way to encourage users to exercise would possibly be by rewarding a user whenever he/she has to do a workout and therefore providing an extrinsic motivation to a point that impacts their behavior. This tactic works well for users that do not enjoy the behavior, in this case those that don't enjoy working out (Deci et al., 1999). Rewards constitute a strong way to get users to alter their behavior within a short term. Though, motivation is

not every time enough to initiate a behavior. UX designers may not always get users to perform an action even though they have the motivation to do it. To understand what motivates users and how a UX designer can adapt a product to the user's level of ability are two key elements in designing mobile app and promote physical activity. However, identifying the triggers that call to action and the right moment to show them to the user is also an important aspect to encourage certain behavior. Methods like user journey maps and personas can help to identify what trigger users have (Kintscher, 2016).

2.3. Existing Fitness and wellbeing apps

Providing a good user experience when using fitness and wellbeing apps with the aim of engaging the user to not only start using them, but also to continue using them afterwards, is a very important task that comprise the usability that helps to reduce the difficulties of user navigation and the unnecessary interaction (Kranz et al., 2013) as well as the motivational and emotional aspects which are relevant not only for the maintenance of the activity itself but also for the maintenance in the use of the mobile fitness application (Nielsen, 1994).

Nowadays, there are a great amount of fitness and wellbeing applications in the market whose aim is to help users working out as well as to engage users to continue using the app to help them working out. 20 of these apps, which can be seen on Table 3, have been evaluated and analyzed in order to find similarities and differences between them as well as to find out which aspects of the user experience they consider.

Based on the results published in Greatist website (Greatist, 2016) and the researchers' findings, a brief description of 20 of the most popular fitness apps in 2015 is described in this section.

To identify these apps, two divisions have been made by the researchers. First, depending on the target user (user with and without previous experience in exercising) and second, depending on the need that is covered by the app (workout with equipment, workout without equipment, running/walking, tracking meals and tracking weight).

Regarding the kind of user to whom the use of these fitness apps is intended, the majority of them are intended to be used by people who vary from completely beginners with no previous experience in doing exercise to fitness professionals who have a lot of experience. However, there are two of them (WOD Deck of Cards who is intended for crossfitters and StrongLifts 5x5 who is intended for people with a certain level of fitness) which require that the user has some previous experience and some knowledge of at least the basics of the exercise.

A summary of this characteristic can be found in Table 4.

Table 4. Target user in fitness and wellbeing applications.

App Name	Target user	
	No experience needed	Some experience needed
FitStar Personal Trainer¹	X	
Nike+ Training Club²	X	
Runtastic Six Pack Abs³	X	
Fitnet⁴	X	
WOD Deck of Cards⁵		X
Sworkit⁶	X	
StrongLifts 5x5⁷		X
Pump Up⁸	X	
C25K⁹	X	
Charity Miles¹⁰	X	
Fitocracy¹¹	X	
Workout Trainer¹²	X	
Strong¹³	X	
Tikis¹⁴	X	
Argus¹⁵	X	
MapMyFitness¹⁶	X	
Endomondo¹⁷	X	
MyFitnessPal¹⁸	X	
Noom Coach¹⁹	X	
Meal Tracker²⁰	X	

¹ <http://fitstar.com/personal-trainer/>² http://www.nike.com/fi/en_gb/c/womens-training/apps/nike-training-club³ <https://www.runtastic.com/sixpack>⁴ <http://fit.net/>⁵ <http://letswod.com/>⁶ <http://www.sworkit.com/>⁷ <http://www.stronglifts.com/apps/>⁸ <http://pumpup.com/>⁹ <http://c25kfree.com/>¹⁰ <http://www.charitymiles.org/>¹¹ <https://www.fitocracy.com/>¹² <http://www.skimble.com/workouts>¹³ <http://www.strongapp.me/>¹⁴ <http://www.tikis.fi/>¹⁵ <http://www.azumio.com/s/argus/index.html>¹⁶ <http://www.mapmyfitness.com/>¹⁷ <https://www.endomondo.com/>¹⁸ <https://www.myfitnesspal.com/>¹⁹ <https://www.noom.com/coach/>²⁰ <http://www2.mealtracker.fi/>

Regarding the need that each of the apps covers, three differentiated groups were identified by the researchers. First, the apps which are intended for only doing workouts, with and/or without equipment, such as FitStar Personal Trainer, Nike+ Training Club, Runtastic Six Pack Abs, Fitnet, WOD Deck of Cards, Sworkit, etc. Second, the apps which are intended for running and/or walking such as C25K, Charity Miles etc. Finally, the apps which are intended for tracking some wellbeing parameters such as calories and weight as for example Endomondo, MyFitnessPal, Noom Coach etc.

However, there are some of them that include characteristics from more than one of the explained groups above such as for example Pump Up which allows the user to perform workouts as well as to keep tracking of the weight or MapMyFitness which is mostly intended for tracking parameters such as meals and weight, but it also allows the user to perform and follow up running/walking workouts.

A summary of this characteristic can be found in Table 5.

Table 5. Needs covered by fitness and wellbeing applications.

App Name	Need it covers				
	Workout with equipment	Workout without equipment	Running/Walking	Tracking meals	Tracking weight
FitStar Personal Trainer		X			
Nike+ Training Club	X	X			
Runtastic Six Pack Abs		X			
Fitnet	X	X			
WOD Deck of Cards	X				
Sworkit		X			
StrongLifts 5x5	X				
Pump Up	X	X			X
C25K			X		
Charity Miles			X		
Fitocracy	X	X			
Workout Trainer	X	X			
Strong	X	X			
Tikis	X	X			
Argus		X			
MapMyFitness			X	X	X
Endomondo				X	X
MyFitnessPal				X	X
Noom Coach				X	X
Meal Tracker				X	

As a result, the two main findings that have been encountered while evaluating these applications are that the majority of them are intended to be used by any kind of user despite his/her age, gender and physical condition and that all of the applications are focused either on fitness aspects or tracking aspects, but any of them comprise both aspects in the same application.

3. COMPETITORS' ANALYSIS

This section presents a competitors' analysis. It is divided into three subsections. First and second subsections present the basics of the motivational factors and usability heuristics that have been used to evaluate the 20 existing applications presented in Table 3. Finally, an evaluation of each of the 20 aforementioned applications is provided. In this evaluation, both, motivational factors and usability problems have been studied so that the problems found can be overcome in the design of SportyPlanner app.

3.1. Evaluation of the motivational factors

Motivational factors play an important role when interacting with fitness and wellbeing applications. If the application does not count with these factors, most probably it will be dismissed by the user in a short period of time.

Depending on the nature of the motivation, it can be divided into two types: intrinsic and extrinsic motivation (Darin et al., 2015). Intrinsic motivation refers to the engagement in an activity that is personally rewarding and therefore, interesting and enjoyable (e.g., a person who goes swimming because he/she likes and enjoys swimming). On the other hand, extrinsic motivation refers to the engagement in an activity with the aim of obtain an external reward (e.g., a person who swims because he/she is participating in a swimming competition and aims to win the prize).

According to Deci & Ryan's (1985) self-determination theory, extrinsic rewards tend to lessen intrinsic interest. However, even though the commitment in the practice of exercise is at first motivated by the extrinsic motivation, it is also necessary to make the exercise as enjoyable and entertaining as possible to make sure that the person does not quit doing the physical activity after obtaining the first reward. Therefore, it is very important that fitness and wellbeing applications take this into account and provide a pleasant experience which motivate the user to continue using them in order to evolve (Darin et al., 2015).

Also, the integration of feedback (in the form of training assessment for the current workout and/or a history of previous training results) in fitness and wellbeing applications is an important factor to take into account as it establishes long-term motivation and engagement (Kranz et al., 2013).

Nowadays, the use of smartphones has a dominant presence around the world and they are changing the way people engage to their everyday lives (Nielsen, 2014). Thus, by using applications that help people to exercise, mobile devices may support the

achievement of a balance between the technology and the physically active life (Bert et al., 2013).

Therefore, aspects that has been considered to be bothering and non-motivational in order to continue using the apps, have been identified by the researchers with the aim of avoiding them in the design of the application developed for this thesis work.

3.2. Heuristic usability evaluation

In order to evaluate the ease of use of the studied applications, Nielsen's heuristics (Nielsen, 1995b) have been selected as they provide quick feedback restricted to the interface of the application such as inconsistencies in the structure, terminology, use of colors etc.

According to Jakob Nielsen, heuristic evaluation (Nielsen, 1995a) is *a usability engineering method for finding the usability problems in a user interface design*. It consists on a careful inspection of the different features in the user interface and a comparison between them and a list of usability principles called the heuristics.

For a heuristic evaluation to be effective, it needs to be done by more than one evaluator separately and then each of the results should be combined so that all the usability problems in the user interfaces can be found (Nielsen & Mack, 1994). Therefore, in this thesis, each of the writers has performed a single evaluation of each of the apps and then the results have been combined.

Nielsen suggests ten heuristics or principles for interaction design (Nielsen, 1995b):

- **Visibility of system status**

"The system should always keep users informed about what is going on, through appropriate feedback within reasonable time."

According to the first heuristic, the system should have appropriate and enough information and advice so that the user can know what is happening all the time (e.g., when doing a workout, the user has to be informed all the time about what exercise he/she is doing and where it is situated inside the whole workout). This feedback should be informative and accurate.

- **Match between system and the real world**

"The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order."

The second heuristic claims that the content of the application should be familiar to those who are using it. For example, if the application is intended to be used by people who are not sport professionals and may not know certain specific terminology, it is recommended not to use specific terminology.

- **User control and freedom**

“Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.”

The third heuristic points out possible problems in navigation that may not allow the users to find what he/she is looking for inside the app as well as the importance to have the chance of going back if the user has accidentally clicked on the wrong button. In other words, the user has to know at all time where he/she is inside the app, how did he/she get there and how can he/she get back to where he/she came from.

- **Consistency and standards**

“Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.”

The fourth heuristic explains the importance of following the commonly known conventions, in other words, users are expecting the system features to be called and to behave the same way that other similar fitness apps do as they are not willing to learn how to use the features of the app from the beginning, but to actually go through them directly.

- **Error prevention**

“Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.”

According to this heuristic, it is very important that the system has the less possible amount of situations in which an error can occur, but if it has, then the system should have clear labels so that the users can know beforehand when he/she is committing an error.

- **Recognition rather than recall**

“Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.”

This heuristic explains the importance of having all the necessary options visible and in the same screen so that the user does not have to wonder where the information they are looking for is located as a lack of visibility may cause them frustration.

- **Flexibility and efficiency of use**

“Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.”

This heuristic claims that users who have used the app regularly and thus, already know how to use the features in the app, find it important to have some kind of shortcuts that allow them to perform the actions faster and more efficiently.

- **Aesthetic and minimalist design**

“Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.”

This heuristic suggests that the app design has to be done in a way that it is unique, remarkable and powerful but at the same time the elements which has been used to perform the features should not distract the user from efficiently completing the intended action.

- **Help users recognize, diagnose, and recover from errors**

“Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.”

This heuristic indicates that it has to be very easy for the user to notice what he/she did wrong and where exactly is the error located. For example, when the user is filling a form, if something is missing or wrongly filled, some kind of indicator should appear to tell the user what is the error about and where it is located.

- **Help and documentation**

“Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.”

Finally, this heuristic means that some kind of tutorials and documentation should be provided in order to help the user in case he/she has troubles while using any feature of the app. This information should be concise, clear and easy to find by the user anytime.

3.3. Evaluation of the 20 most popular fitness apps

As a pre-study for this thesis work, 20 of the most popular fitness applications presented in Tables 3 and 4 in section 2.3 have been studied and analyzed in order to discover possible usability problems and issues on the motivational factors. Based on these evaluations, the discovered usability problems and motivational issues encountered have been tried to be avoided in our own design.

The 20 chosen apps have been divided into two different groups based on their main functionality, 14 fitness apps and 6 tracking apps.

Fitness apps are those that its main aim is to help and guide the user on how to perform physical exercise such as running, walking or working out with equipment. 14 fitness apps have been analyzed to perform the heuristic evaluation in this thesis work (FitStar Personal Trainer, Nike+ Training Club, Runtastic Six Pack Abs, Fitnet, WOD Deck of Cards, Sworkit, StrongLifts 5x5, Pump Up, C25K, Charity Miles, Fitocracy, Workouts, Strong and Tikis)

Tracking apps are those whose main focus is on helping the user to track different aspects of their wellbeing such as meals, calories, sleeping time or heart rate. (Argus, MapMyFitness, Endomondo, MyFitnessPal, Noom Coach and Meal Tracker).

Moreover, the problems that have been encountered in each type of app have been divided into motivational issues, which deal with factors and characteristics that stimulate users to continue being interested and using the app or to discard it, and usability problems, that deal with the effectiveness and efficiency with which the users achieve their intended tasks while using the app.

3.3.1. Issues on motivational factors in the fitness applications

The most important issues on motivational factors which have been found in the fitness apps category are related to the way the performance of the workouts are accomplished. These issues have been selected based on the researchers' opinions and the existing literature regarding motivational factors discussed in section 3.1 and 5.1.1.

First of all, seven out of 13 of the apps do not include *videos* that show how to perform each of the exercises that formed the workout. The target users of these apps can vary from completely beginners to well experienced users, therefore, even though videos may not be an important feature for experienced people, they are a very valuable feature for beginners and people that, even though are used to exercise, do not know the technique so that the exercise can be performed without any problem such as injuries.

Moreover, in some of the apps, there is not *guidance* during the workouts which means that beginner users may not know what they have to do (how many series, repetitions, how the exercise is performed, what they have to do next). In some cases, such as in *WOD Deck of Cards* app the visualization of how many repetitions have each exercise is very confusing as it is based on game cards and therefore, there should be a description for newbies about what each of the cards represent.

In addition, in some of the apps there is not *control like timing etc.* during the workouts which may allow users to even cheat while doing the exercises as it is the case in StrongLifts 5x5 app.

Another important feature that is not covered by the majority of the apps is the possibility of *giving feedback* when the workout is completed and *receiving feedback from a real personal trainer*. For that purpose, some of the apps include avatars and virtual personal trainers and give general advice to users which may not be helpful as each person may have different goals and needs.

Furthermore, we observed that most of the applications do not include a *calendar* section that allows the user to schedule his/her workouts nor any tool which allows the user to track and monitor the most common goals such as weight, sleeping time etc. and thus, it provokes that the user cannot follow all the aspects of their wellbeing in a single app and thus, an extra application to monitor those is needed.

Finally, there are some applications such as *Pump Up* and *Sworkit* which allow their users to *create their own workouts* and to *share* them with other users. This idea might be interesting in the sense that there are a huge amount of different free workouts for the user to choose from but on the other hand, it might be dangerous because people who create the workouts may not have knowledge about the design, implementation and evaluation

of fitness training as well as health-related fitness knowledge so that the created workouts are suitable and secure for the rest of users to perform.

A summary of all the issues on motivation found in Fitness apps can be seen in Table 6.

Table 6. Motivational issues in fitness apps.

Motivational issues	FitStar Personal Trainer	Nike+ Training Club	Runtastic Six Pack Abs	Fitnet	WOD Deck of Cards	SworKit	StrongLifts 5x5	PumpUp	C25K	Charity Miles	Fitocracy	Workouts	Strong	Tikis
No different programs	X				X		X		X					
Videos are not included		X	X		X		X						X	
No guiding during workouts		X			X		X							X
No clear functionality use		X			X		X							X
No follow-up of goals	X	X	X	X	X				X	X	X			
No motivational factors			X	X	X		X							
No counting of the repetitions				X	X			X		X				X
Not possible to give feedback		X		X	X	X	X	X	X	X			X	
The visualization is confusing				X	X									
Not completed workouts are lost				X	X				X					
Workouts creation and sharing					X	X		X						
No progress log or diary								X	X					X
Way of entering the information					X		X						X	
No premade exercises					X								X	
No feedback from a real PT	X		X	X	X		X						X	
No calendar	X	X	X	X	X	X		X	X	X				X

3.3.2. Usability problems in fitness applications

Several usability problems have been found in the fitness category applications.

First of all, there is a *lot of information on the main screen* of some of the applications (Runtastic Six Pack Abs, StrongLifts 5x5, Workouts, etc.). This problem violates the *Visibility of the system status* heuristic because as there are so many options on the home screen to choose from, it may not be clear for the user what to do. In addition, four of the apps do not have any main screen at all which makes even more difficult for the user to know which options they have available.

Second, even though, as stated by Nielsen in *Help and documentation* heuristic, it is preferred if the application can be used without the need of help, fitness apps usually include a lot of features and therefore they are complex enough to require some kind of help for the user to understand how they work. It has been observed, though, that the majority of the studied apps do not have any kind of *help or documentation*.

Third, a great amount of problems in the *navigation* of some of the apps have been found. For example in FitStar Personal Trainer app when the user is inside of any of the options included in the options menu and clicks on the 'back' button, the navigation goes to the main screen instead of going to the options menu. Another example is found in *WOD Deck of Cards* app, when the user is performing a workout and clicks anywhere on the screen by accident, the navigation continues with the next exercise even though it is not yet completed. Other problem related to navigation is that some of the apps are very slow because they contain a lot of non-useful options such as advertisements and links to external websites.

Finally, important usability problems have been found when the user is performing a workout. More specifically, *the way the workouts are displayed* in some of the apps is very *confusing* because all the exercises contained in the workout are shown together and there is not any separation between them so it is difficult for the user to know when an exercise is finished and when he/she has to start with the next one.

3.3.3. Issues on motivational factors in tracking applications

The most important issues on motivational factors which have been found in the fitness apps category are related to the way the information is entered in the app as well as the workout guidance offered. The issues discussed in this section have been selected based on the researchers' opinions and the existing literature regarding motivational factors discussed in section 3.1 and 5.1.1.

One of the most important features in the majority of tracking applications in the market is *keeping track of the calories* that the user has consumed, so that users are aware of the calories they have already consumed during the day and the remaining calories they can ingest without exceeding the recommended amount of calories depending on their fitness goals.

One of the motivational issues found in the majority of the apps is that the user has to *enter all the information* regarding the eaten foods *manually*, that is, the user has to search for what he/she has eaten in a list of foods or even ingredients. This is not only a tedious and time consuming labor, but also the calories counted may not be reliable as it is sometimes difficult for the user to find the right dish he/she has eaten.

Another issue that has been found is that it is not possible to *create custom workouts* in some of the tracking apps (*Argus* and *Meal Tracker*) and in the cases when it is possible to create those, it is not possible for the user to set the number of sets and repetitions of each of the exercises (*MapMyFitness*) or they only allow to enter a limited types of exercise (*MyFitnessPal*).

Moreover, it has been observed that half of the tracking apps do not include a *calendar section* in which the user can monitor and check all the information not only for the current date but also for the previous ones.

Finally, the majority of the apps do not offer the possibility *of receiving feedback from a real personal trainer*. Instead, they offer the sum of the consumed calories and the remaining permitted ones as well as some general tips.

A summary of the issues on motivation found in Tracking apps can be seen in Table 7.

Table 7. Motivational issues in tracking apps.

Motivational issues	Argus	MapMyFitness	MyFitnessPal	Noom Coach	Meal Tracker	Endomondo
No custom workouts	X				X	
Logging the food manually	X	X	X	X		X
No calendar section		X	X			X
No setting of the number of sets and reps		X				
Only two types of exercise permitted	X		X			
No feedback from a real PT	X	X	X	X		

3.3.4. Usability problems in tracking applications

Regarding the usability problems found in the tracking apps, it is worth mentioning that some of the apps (especially Argus and Noom Coach) violate the *Visibility of the system status* heuristic as they have a *lot of information* at a glance in the main screen which increases the difficulty when using the app.

Furthermore, in *MapMyFitness* app it has been observed that important features such as 'log food' are not shown in the main screen. Instead they appear in the options section so it is not only more difficult for the user to find the feature, but also the user has to click more times to enter the desired functionality and therefore, it makes the use slower.

4. DESIGN OF SPORTYPLANNER MOBILE APP

This section contains the design process of the application developed for this thesis work, SportyPlanner app. It contains all the details of the design process such as product vision, functionalities, navigation etc. as well as detailed views of the system.

4.1. Product vision

As it was discovered during the literature review and the heuristic evaluation of current fitness and wellbeing apps in the market, the design of the SportyPlanner app required to be simple to use while also providing motivational features for the users. One of the main goals was to showcase the possibilities and benefits of having a real personal trainer creating the workout plans and giving feedback to the user. Also to provide workout tracking features for the user to measure his/her progress in a more quantitative way, besides having constant communication with the personal trainer. In overall, the company provided a few requirements that should be included to make the app compatible with the service they provide through the web.

Another feature that has been chosen to improve is how the users receive the exercise plan and how they access it while working out in the gym or outdoors. The company have declared that users complain about printing the plans because they cannot see the videos, which they find quite useful. In the current system, users receive a PDF or a link to the website, not solving the problem because they have to carry a computer or tablet to the gym and have connection to the Internet. Another reason to redesign this feature is that the company wants to avoid customers sending their workout plans to other people who are not paying for the personal trainer services. For this purpose, the design of the new mobile phone application should allow users to access the workout plans and videos only if they have registered their accounts. This would also allow the users to download content to their mobile phones and watch videos offline for example, improving the experience for their customers.

Another requirement was the need for keeping track of the customers that a personal trainer has and the other way around. So the app had to include a section where the customer could check his/her current personal trainer and look for other professionals in case they want to. The customers can view relevant information about personal trainers, including ratings by other customers to make a better decision. Seeing progress, previous plans as well as current plans, or communicating with personal trainers are the main characteristics the app should have.

The design of the app had to be done around tracking the customer's workout and therefore the calendar played a key role to organize the information of the different routines. It should be possible to differentiate what workouts were completed/skipped and which ones are missing in a quick view from the customer. A lot of emphasis was put into making this work with the rest sections of the app.

4.2. Functionalities

Getting fit is a complex task that combines not only the physical exercise itself, but also other aspects of a person's daily routine such as what the person eats or how well the person sleeps during the night. Therefore, the designed app for this thesis tries to cover a huge variety of functionality so that the user has all the features that he/she may need when getting fit and exercising.

The main interaction interfaces comprehend the main screen and the options. The main screen is divided into three sections as it can be seen in Figure 4. The first one, the upper bar allows the user to access the basic options such as profile, account or help options among others by clicking on the icon situated in the right side of the bar. Those options which can be seen in Figure 4, will be explained below. The second section, which covers most part of the screen, shows the most important information for the user to know, which is the current date and the workouts that have been planned for that day. Finally the third section on the lower side of the screen shows three icons, the home icon on the left side which returns the user to the main screen, the options icon on the middle which allows the user to navigate between all the features in the app and the chat icon on the right side.



Figure 4. Main screen of SportyPlanner App.

The basic options that appears when the user clicks on the options' icon situated on the right upper side of the screen are divided into three sections. The first one is 'Profile & Account'. In this section the user can edit all the personal details and information that he/she has entered when registering in the app. These details include name, email and password and information regarding the age, height, weight and goals among others. The second section, 'Help', includes a getting started tutorial that explains novice user how to use the app and a frequently asked list of questions. Finally, 'Other' section includes the privacy and terms of use and allows the user to contact and/or give feedback to the company. All these options can be seen in Figure 5.

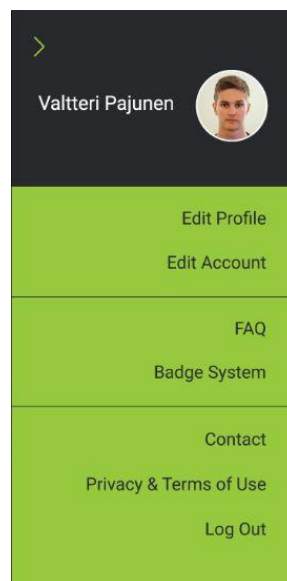


Figure 5. Basic options in SportyPlanner App.

On the other hand, when the user clicks on the options' icon situated on the middle lower side of the screen, a menu showing the different features of the app is displayed as it can be seen in Figure 6.

It has been chosen to be done like this because it is clearer for the user to have one button that comprised all the possible features instead of having all the options displayed together in the lower bar of the main screen. If all the features would be displayed together, there will be a lot of options allocated in just one bar which means that icons would be very small and therefore, difficult to be found and clicked.

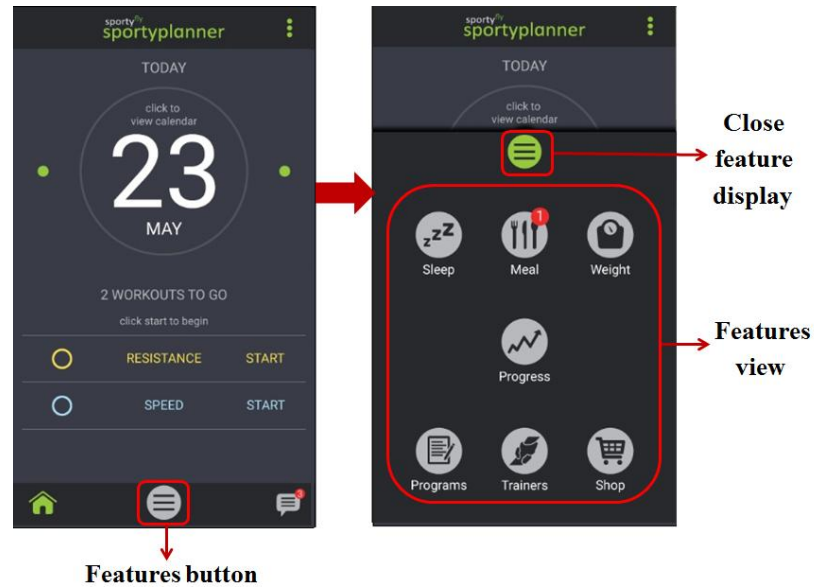


Figure 6. Menu of the features of SportyPlanner App.

Apart from the main interaction interfaces, SportyPlanner app offers different features aiming at covering all the aspects that should be taking into account while getting fit. The main functionalities of the app are explained in the next subsections.

4.2.1. Calendar feature

The calendar section is the most important section in the application. It can be accessed by clicking on the big icon containing the current date inside the main screen. It shows a monthly calendar in which the user can see not only the workout planned for today, but also the past workouts that were completed or missed by the user and the future ones. Moreover, in each of the days the user can see a summary of the workouts, meals, weight and sleeping time, in other words, it functions as a personal diary in which the user can do a follow-up of their progress and be reminded about the future planned workouts. In addition, personal trainers are also able to see the calendar diary of their customers as they are the ones scheduling the workouts. In Figure 7 two of the calendar section screens are presented.

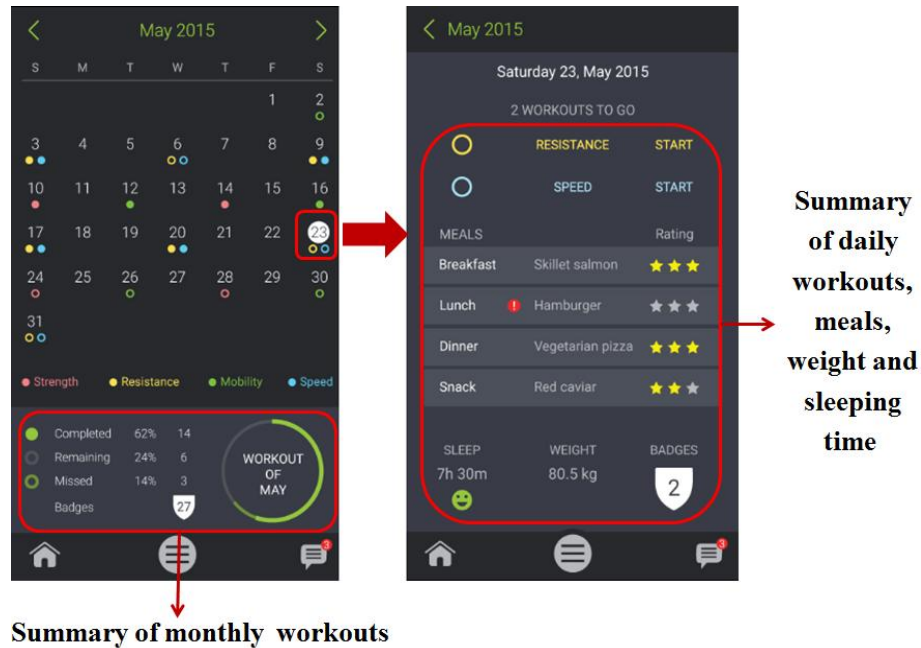


Figure 7. Calendar section in SportyPlanner App.

4.2.2. Chat feature

Chat feature allows the user to communicate and stay in touch with his/her personal trainer/s and also contact new ones. This feature is one of the key features because unlike other apps, by using SportyPlanner app, the user can receive feedback in real time from a real person instead of having an avatar as a personal trainer. In Figure 8 chat feature screens are shown.

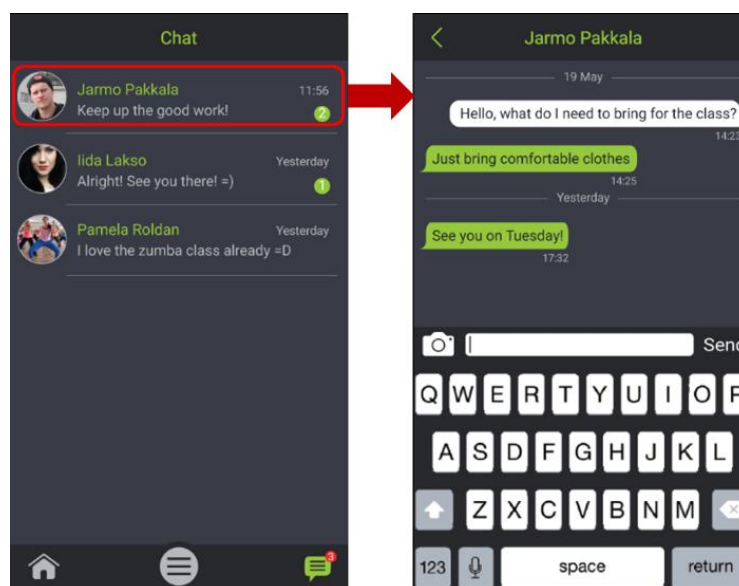


Figure 8. Chat feature of SportyPlanner App.

4.2.3. Workout assistant feature

The workout feature is one of the most important ones as it allows the user to follow the current workout session in real time. First, the user can read the general information regarding the workout such as warm up, routine and stretching tips. After that, each of the exercises that are included in the session are shown for the user to follow as it can be seen in the second screenshot in Figure 9. In each of the exercises the user can see the information regarding the exercise, a video showing how the exercise is performed and the number of sets, repetitions, the weight used in each set and the resting time. Moreover, a timer that counts the resting time has been added so that the user does not have to count it him/herself. When the user is done with the current exercise, the next one appears. Finally, when the whole workout is complete, the user is prompted to answer a short feedback form which is sent to the personal trainer so that he/she can follow the progress of his/her clients.

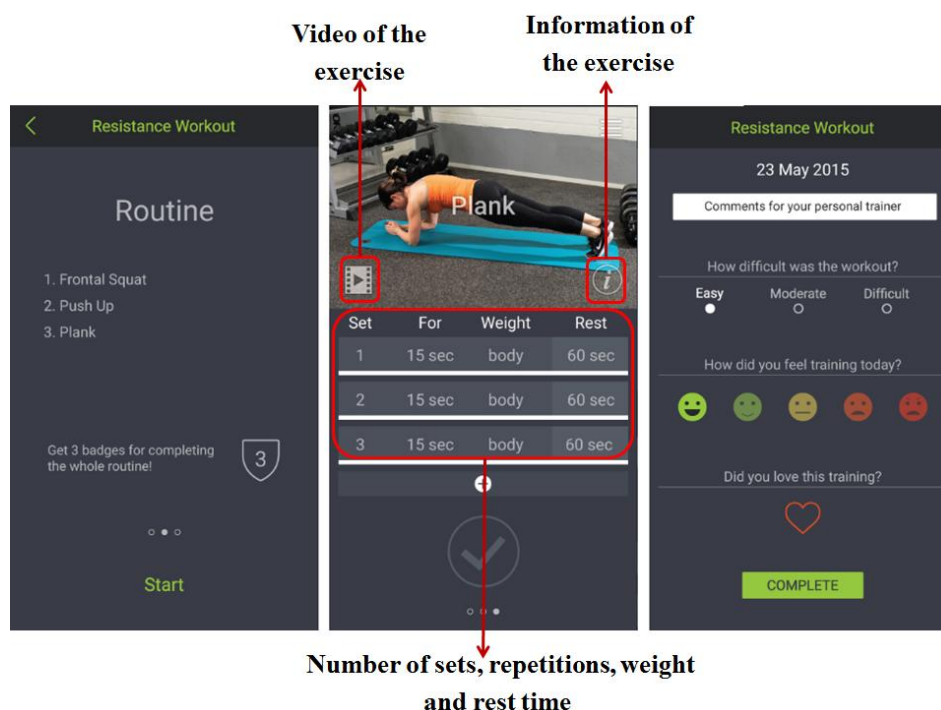


Figure 9. Workout feature of SportyPlanner App.

4.2.4. Meal tracker

Meal tracker allows the user to register as well as to send to his/her personal trainer each of the meals that he/she has eaten during the day. This way, the user can receive personalized feedback about how healthy or not he/she is eaten directly by his/her personal trainer. Moreover, as adding meals by searching them from a huge list or by manually writing a description of them can be very annoying, this functionality has been

designed so that it is very easy and fast for the user to add what he/she has eaten. As it can be observed in Figure 10, the user can take a picture of the current meal and upload it to the app.

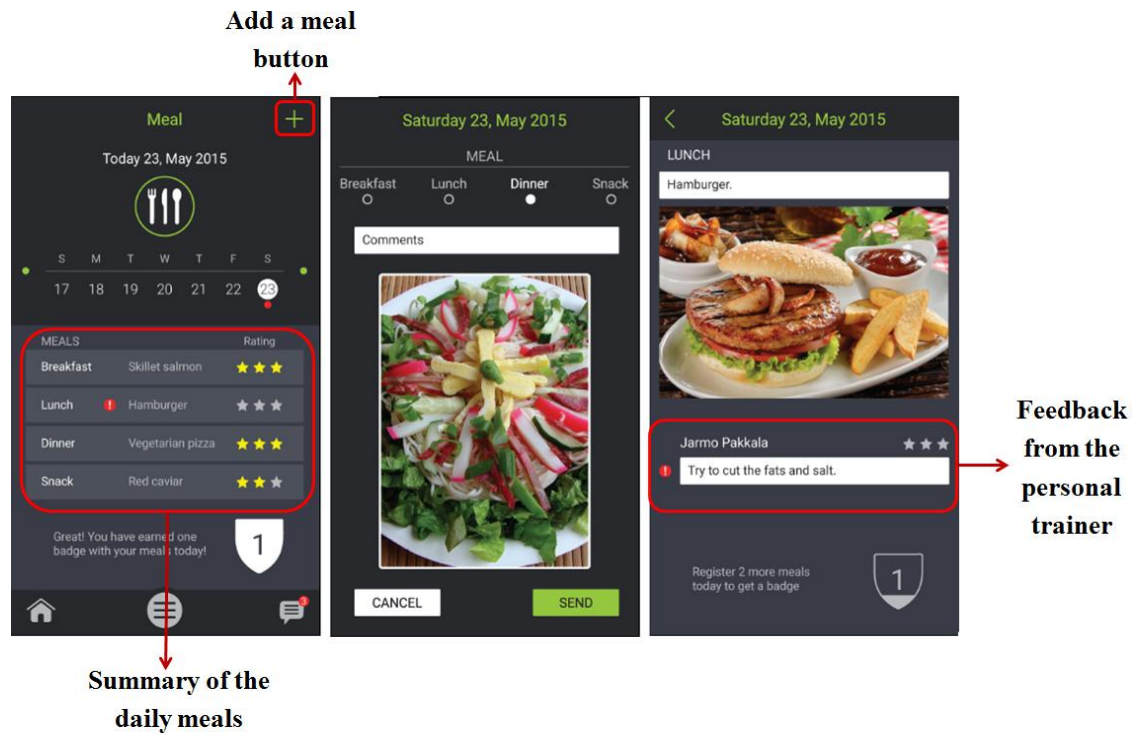


Figure 10. Meals section of SportyPlanner App.

4.2.5. Weight tracker

Weight tracker allows the user to follow up his/her own weight by manually registering it into the app. When the weight is registered the user can check his/her progress by checking the weekly and monthly graphs. This functionality can be seen in Figure 11.

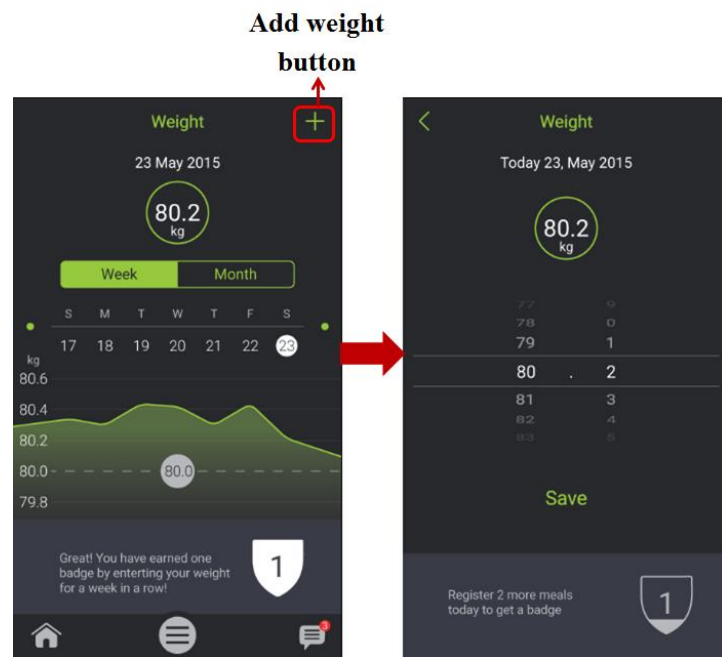


Figure 11. Weight section of SportyPlanner App.

4.2.6. Sleep tracker

The user can also check his/her sleeping time as well as the quality of the sleeping by entering the times into the sleep tracker section. Moreover, as in the weight tracker section, the user can follow-up this information in the weekly and monthly graphs that are shown. This functionality can be seen in Figure 12.

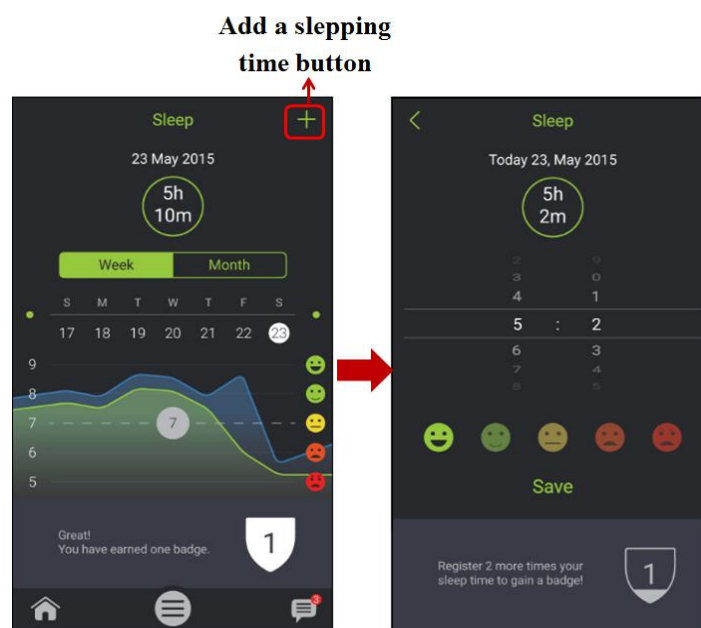


Figure 12. Sleeping time section of SportyPlanner App.

4.2.7. Progress visualization

In the progress section the user can register and follow up the number, weight used and/or time (depending on the type of exercise) that he/she has achieved in each of the previous exercise sessions. This can be seen in Figure 13.

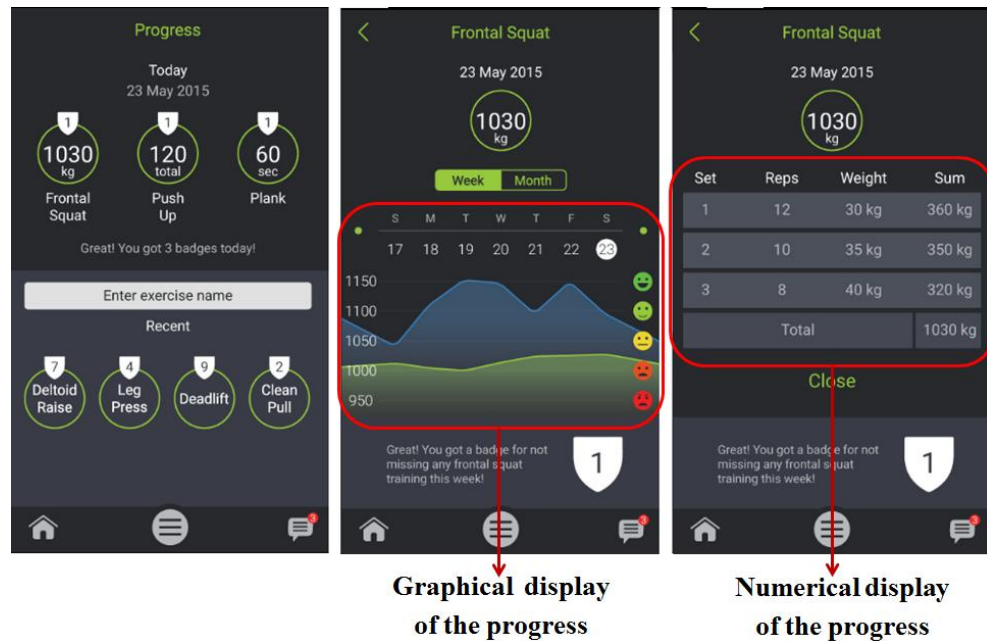


Figure 13. Progress section of SportyPlanner App.

4.2.8. Personal trainer feature

Personal trainer section allows the user to communicate and give feedback to the user's current personal trainer as well as to get in touch and hire other personal trainers from a pool of trainers currently working with SportyPlanner. When the user enters this section, a screen showing the user's current personal trainer is shown. From here, the user can see important information regarding his/her current personal trainer as well as chat with him/her and send him/her general feedback, as it can be seen in the first screenshot in Figure 14. However, if the user wants to change from personal trainer or hire a new one, by clicking on the plus icon (+) in the right upper side of the screen, a list showing information regarding other available personal trainers is shown. From here, the user can start chatting with any other personal trainer he/she may be interested in.

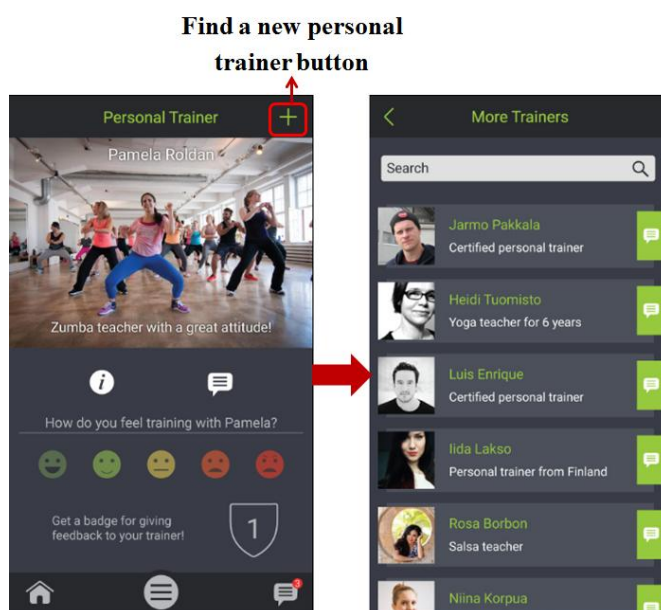


Figure 14. Personal trainer section in SportyPlanner app.

4.2.9. Online shop feature

Online shop section allows the user to select from a great variety of new pre-made programs and buy them. When the user enters this section, a list of all the available pre-made programs is shown. From this list, the user can select and read the detailed preview description of each of the programs. If the user is interested in the program, he/she can easily buy it by clicking the *Buy* button. This program will automatically become available for the user to workout. This functionality can be seen in Figure 15.

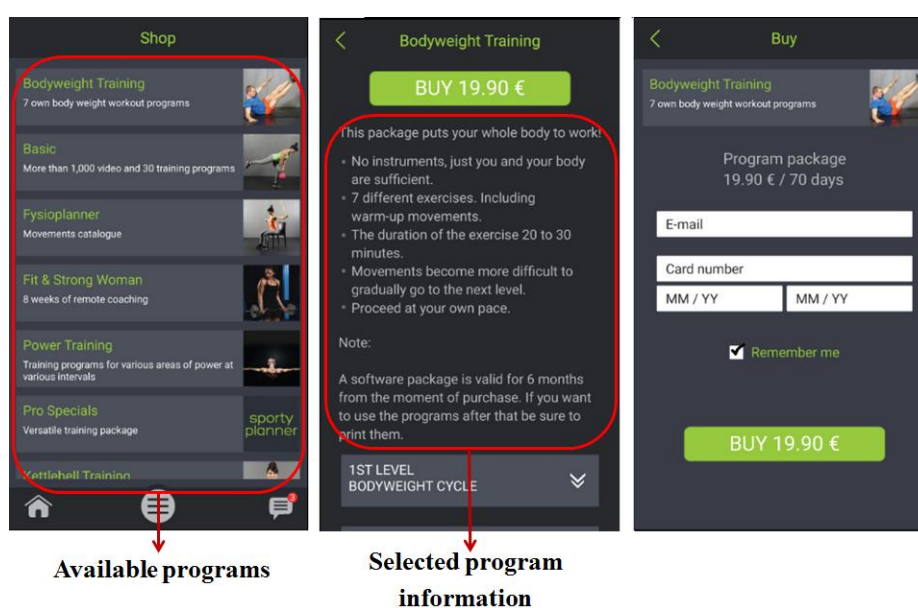


Figure 15. Online shop in SportyPlanner app.

4.2.10. Programs monitoring

My Programs section allows the user to keep track of not only the current program he/she is doing right now, but also all the previous programs that the user did in the past. This section is divided by two tabs, current and previous, as it can be seen in Figure 16. Current tab shows the user a detailed description of the program that the user is currently doing while previous programs tab contains a list with all the previous programs and their detailed descriptions.

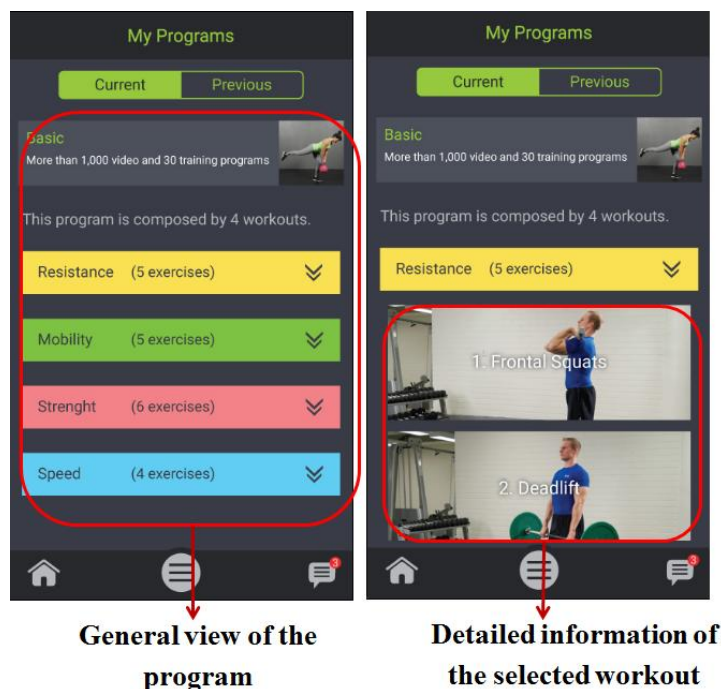


Figure 16. My Programs section in SportyPlanner app.

4.2.11. Rewarding system

Finally, a rewarding system has been designed in order to motivate users to continue exercising and thus, using the app. As it can be seen in Figure 17, by using the different functionalities of the app (i.e. finishing each of the exercises inside the workout, registering the current weight, etc.) the user gets badges that are accumulated and when the number of accumulated badges are enough, they can be changed by the user for discounts in different items and/or products such as new programs purchased in the online shop, free sessions with a personal trainer or discounts vouchers in different sport stores.

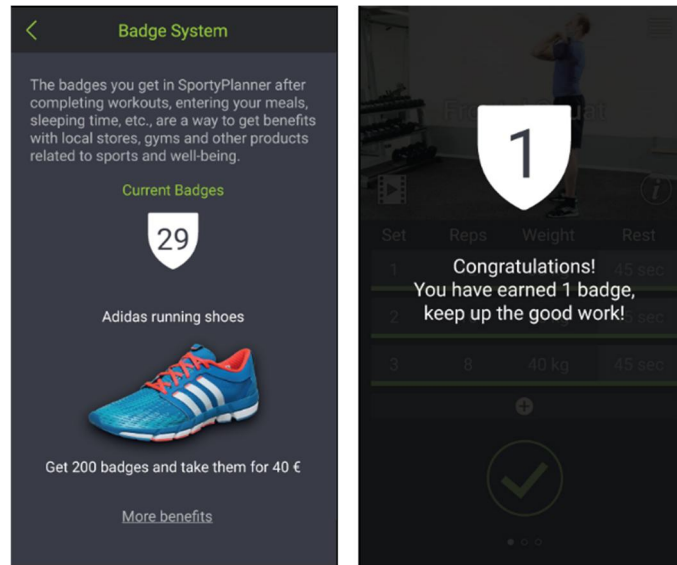


Figure 17. Badge rewarding system of SportyPlanner App

4.3. Human Interface Guidelines

Human interface guidelines are defined as a set of recommendations that capture design knowledge with the aim of helping designers to make the right design decisions when designing user interfaces (van Welie et al., 2000). Its main purpose is to improve the user experience by helping in the creation of application interfaces which are more intuitive and with a consistent behavior of their common elements.

Nowadays, all the existing mobile operating systems have its own human design guidelines for designers to follow. As the application designed for this thesis has been designed for Apple iOS, iOS Human Interface Guidelines have been followed. Therefore, in this section, a summary of the iOS design guidelines used is explained.

According to the iOS Human Interface Guidelines defined by Apple (iOS Developer Library, 2016) the design principles in which the design of iOS mobile applications is based are the following:

- Aesthetic integrity
- Consistency
- Direct manipulation
- Feedback
- Metaphors
- User control

First, aesthetic integrity means that there has to be coherence between the application's appearance and its functionality and behavior. Even though it is important for an app to have a nice appearance, this factor always depends on the nature of the application itself

as it is not as important in an application that helps people to perform a serious task than in a game application. In this sense, SportyPlanner app combines a nice and catching layout which at the same time is simple to use as it tries to contain not so much unneeded information. Workouts, which are the most important functionality, are also easy to follow as the user can check the information regarding the exercise and the video showing how to correctly perform it.

Second, consistency refers to the fact that the design of the application has to consider the standards and patterns that people already know by using other applications or a previous version of the current one so that it is possible for them to predict in advance what will happen if they perform an action. In order to adjust to this principle several actions have been made: icons designed for SportyPlanner app have been kept as simple as possible and it contains graphical representations which are easy to understand and also, text below the icons has been used in order to clarify the meaning of those in case it is needed. Moreover, the terminology and wording used have been kept easy to understand and in a uniform way throughout the app. Furthermore, graphics containing the information regarding common user goals such as progress, weight and sleeping time has been designed with different colours and scales in order to be more understandable and appealing. Also, tooltips explaining the meaning of the colours have been added and they appeared when the user clicks on the graphic.

Third, direct manipulation states that users understand better the results of their actions when they have the possibility of controlling and manipulating on-screen objects instead of using separate controls for it. Only swapping to the left and right in some of the screens is permitted while using the app. Rest of the gestures that implies direct manipulation are not used in SportyPlanner app as they are not needed to perform any task.

Fourth, feedback refers to the fact that it is important for the user to know what has happened while and after performing a certain action and therefore, some kind of confirmation has to be given in order to show the results and/or updates the progress in the completion of a task. In SportyPlanner app feedback is provided to the users in several ways: by showing short messages to the user right after the user has completed a task, by showing translucent UI elements which blurs the content on the screen behind it but it does not blur the rest of the screen in order to provide context to the users and by showing the progress of the current day's workouts in the calendar icon at the main screen.

Finally, user control means that it is important for the users to feel that they are in control of the actions and tasks that they are performing. However, there should always be a balance between giving users the decision-making possibilities and the way the app manages the undesirable outcomes. While using SportyPlanner app, users feel they are in control of the app as it is possible to cancel or pause the workouts anytime without losing the information. Also, all the actions that the user can perform (e.g. chatting with the

personal trainer, sending and registering meals, entering weight and sleeping time information, following a workout, etc.) have been kept simple and straightforward so that users can easily recognize, understand and remember them.

4.4. Navigation

The User Environment Design (UED) shows the blueprint of the system. It shows each component of the system, how it supports the user's work, exactly what functions are available in that part, and how the user gets to and from other parts of the system (Beyer & Holtzblatt, 1997).

The UED diagrams showed below concentrate the overall structure of the system and demonstrates how the user can move between different main views. These diagrams were constructed taking into account the requirements specified by the company and the designers. The aim is to promote the communication between the personal trainer and the trainee while supporting the services that SportyPlanner provides with their website version of the service.

The main sections of the UED model contained in this project are:

- Log in
- Home screen
- Options
- Chat
- Advanced features panel

Diagram in Figure 18 concentrates the main functions available to the user in the home screen along with the links that conduct him/her to the central sections of the mobile app. The idea behind the arrangement of features that the home screen presents came from the desire of having only the essential information the user needs on their everyday interaction with SportyPlanner. This reflects into having the calendar as a key feature of the app and the workout information of that day.

Diagram in Figure 19 shows how the flow of work for the user is when him/she is starting a workout. The company wanted to have at the beginning of the training session information related to warming up because they found out users often skip this phase of the workout. Next comes the first exercise of the workout routine which has detailed information for the user such as a video and instructions on how to perform the exercise. There should always be an option that allows users to interrupt the working out session as required by the company stakeholders.

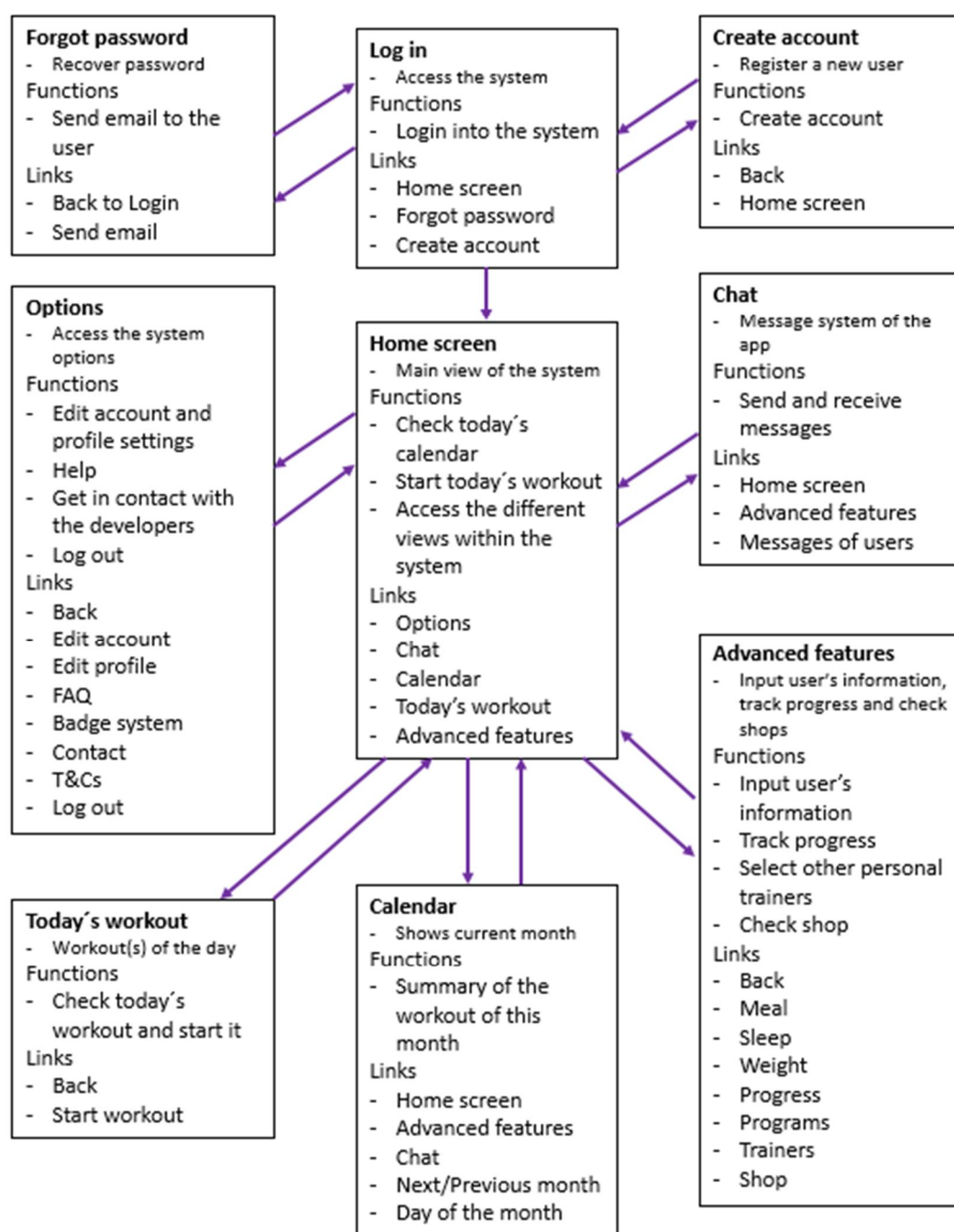


Figure 18. Home screen and main sections.

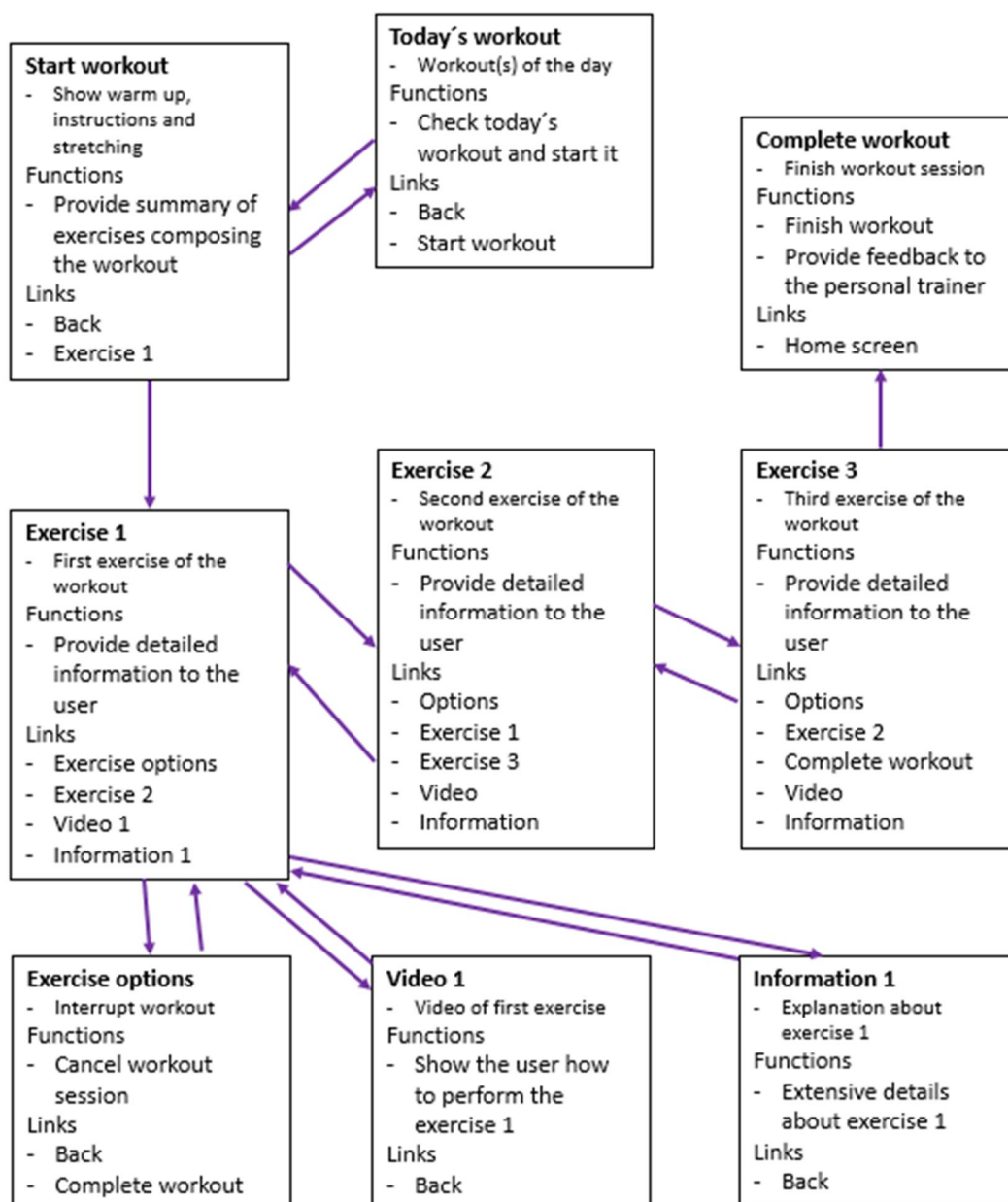


Figure 19. Flow of work when the user starts a workout.

The rest of navigation flows can be seen in Appendix 1.

5. EVALUATION

This section includes an evaluation of the design as well as the results of the evaluation with real users. It is divided into four subsections. First, different models which propose design strategies in order to support physical exercise are presented. After that, one of the presented models has been selected and it has been compared with the design strategies that have been used in order to design SportyPlanner app. In addition, a proposal of new design strategies that have not been considered in the aforementioned model has been developed. In the second subsection the methods that has been used in the evaluation with participants are explained. Third subsection includes a description of the type of users as well as the contexts of use that have been presented during the evaluation. Finally, in fourth subsection, the results of the evaluation are described.

5.1. Evaluation of the motivational factors and design strategies used in SportyPlanner app

The process that has been followed in the development of this thesis work consisted on firstly designing a fitness mobile application based on the company's requirements as well as in the researchers' criteria. After that, the motivational factors and design strategies proposed by previous studies have been evaluated. In addition, one of the models has been selected and its design strategies have been compared with the actual design strategies that were followed during the design process. Therefore, this section contains an overview of the existing literature on models on motivational factors in fitness and wellbeing mobile applications as well as the evaluation of the design strategies used in the design process of SportyPlanner app. Finally, a proposal of new design strategies that have not been considered in the selected model has been developed.

5.1.1. Existing models on motivational factors in fitness and wellbeing applications

Recently, motivational factors affecting the use of mobile applications focused on fitness and wellbeing have been studied by different scholars (Ahtinen, 2015; Consolvo et al., 2009; Kappen et al., 2016; Stawarz et al., 2015; Yoganathan et al., 2015). In this section, different recent models are considered in order to study the different design strategies proposed. After that, one of the models is selected in order to study and compare the proposed design strategies with the ones that have been used in the design of SportyPlanner app, the application created for this thesis work.

Consolvo et al. (2009) proposed a set of design strategies for persuasive technologies whose aim is to support behavioral change in everyday situations. The model includes

eight design strategies. First, *abstract & reflective* refers to the fact that the information which shows the user what his/her behavior was and how this behavior relate to his/her goal should be displayed by using data abstraction instead of raw or explicit data. Second, *unobtrusive* claims that the data should be always available whenever and wherever the user needs it and most importantly, it should be presented and collected by using an inconspicuous method. Third, *public* means that the data should be collected and showed to the user in a way which makes the user feel comfortable even in the case that other people can see it. Fourth, *aesthetic* refers to the way in which the physical and virtual aspects of the technology should be presented to the user. They should be presented in a form that the user perceives as satisfactory and appealing in order to support the user's personality. Fifth, *positive* supports the use of positive reinforcement and rewarding when the user correctly performs the desired behavior. Sixth, *controllable* relates to the possibility of allowing the user to add, edit, remove and/or manipulate data so that he/she feels in control. Seventh, *trending / historical* refers to the fact that the information related to the behavior which occurred in the past in relation with the user's goals should be provided to the user in a reasonable and attainable way. It also should support the portability of data in case the user changes his/her device. Finally, *comprehensive* states that the data should not only be limited to the specific behaviors that the technology can monitor, but also to a wider range of behaviors.

Yoganathan et al. (2015) proposed a model that includes features that increase *the self-efficacy* while exercising, support *positive outcome expectations*, facilitate a good *self-regulation* and encourage *social facilitation*. First, *self efficacy* refers to the people's perception of their capabilities to accomplish a certain task or outcome (Bandura, 1986). In order to encourage physical activity behavior and thus, the continuity of using a fitness app to do so, features that augment the exercise self-efficacy of users such as making a design that reduces the complexity of exercise behaviors by breaking them into simpler tasks (Yoganathan & Kajanan, 2013) or making a design that guides the users throughout the exercises (Yoganathan & Kajanan, 2013) should be included. Second, *outcome expectancy* refers to a person's appraisal that a given behavior will produce a certain outcome (Bandura, 1986). In order to have positive outcome expectations, features that simulate real entities, reinforces current behavior and provide suggestions at the right time should be included (Yoganathan & Kajanan, 2013). Third, *self-regulation* refers to criteria that an individual set on himself/herself for behaviors with the aim of reaching his/her goals (Bandura, 1986). In order to formulate effective self-regulatory strategies, persuasive design principles such as self monitoring and tailoring or customization technologies should be included in the design (Yoganathan et al., 2015). Finally, *social facilitation* refers to socio structural factors that allow people to improve their physical activity performance (Yoganathan & Kajanan, 2013). In order to do so, social facilitation techniques such as promoting physical activity though social networking sites, allowing to compare user's activity behavior with his/her friends' one, gamification such as virtual

competitions and the possibility of interaction among members in social networks should be added in the design (Yoganathan et al., 2015).

Other model is the one proposed by Kappen et al. (2016) which is based on gamified physical activity applications for elderly people. The study applies Self-Determination Theory (SDT) (Deci et al., 1994) and Kaleidoscope of Effective Gamification (KEG) (Kappen & Nacke, 2013) to study fitness motivation. The design strategies presented by Kappen et al. (2016) are divided into four design challenges. First challenge is to *understand the life stage of older adults to motivate users without playing on their fear*. The design strategies to do so include building confidence through positive reinforcement by dividing the physical activity into small tasks or routines which are tailored to individual characteristics. Second challenge refers to *offering engaging and interesting feedback when doing physical activity exercises* by using automated feedback from peers and exercise professionals. Third challenge discusses the possibility of *including social sharing to create a community*. The designer, however, should select the right information to share such as motivational messages, peer support or encouraging and motivating stories or anecdotes. Finally, fourth challenge refers to the need of *encouraging ownership and empowering autonomy* by modeling experiences in order to facilitate physical activity behavior.

Stawarz et al. (2015) proposed another different set of three design guidelines for habit formation applications. First, applications should *support trigger events* by allowing users to create implementation objectives and monitoring their behavior afterwards. Second, applications should *utilize reminders* to provoke reinforcement in the implementation objectives by reminding users in advance with the use of notifications. Finally, designers should *avoid features* such as self-tracking *that make users rely on technology* and thus, impede the process of habit formation.

Ahtinen (2015) proposed a complete set of design strategies and guidelines for mobile based applications in order to support physical exercise. The design strategies presented are divided into six dimensions: *Support My Exercise*, *Be my Advisor*, *Grow with Me*, *Utilise my Sociability*, *Keep Me Engaged* and *Visualise My Exercise*. First dimension (*Support My Exercise*) is the main and most important dimension which includes the basic supporting strategies that should be included in the design of mobile applications whose aim is to support physical exercise. The other five dimensions are equivalent to each other as they are optional to be included in the design of fitness mobile applications.

5.1.2. Evaluation of the design strategies used in the design of SportyPlanner app

In order to evaluate the design strategies that have been included in SportyPlanner app as well as to answer the research question number two of this thesis, *which design strategies are the most suitable so that SportyPlanner app motivates its users to continue exercising?*, the model proposed by Ahtinen (2015) has been selected. The main reason why this model has been the one chosen for inspection is that it is one of the most complete and comprehensive model out of the recent ones presented above and therefore, it has been considered as the most appropriate by the authors of this thesis. Next, an analysis of the design strategies included in SportyPlanner app in comparison with the aforementioned model is discussed.

Dimension 1 or *Support My Exercise* contains the basic design strategies for motivational fitness applications. It comprises seven strategies which are: *automatic tracking*, *comprehensive tracking*, *short- and long- term data*, *goals setting*, *progress towards goals*, *acknowledging and rewarding*. First, *automatic tracking* refers to the non-manual tracking of different parameters about the physical activity in order to trace the whole performance progress. Second, *comprehensive tracking* is about tracking more than one different parameter of the physical activity in order to have complete a picture of the activity. Third, *short- and long- term data* refers to the possibility of having track of not only recent data, but also the past one. Fourth, *goals setting* discusses that applications should allow users to state their goals, both short- and long-term ones, while doing exercise. Fifth, *progress towards goals* refers to the need of providing the user with information and feedback regarding the progress of their own goals. Sixth, *acknowledging* reflects that the application should give positive encouragement and reinforcement as acknowledgment for the physical exercise done. Finally, *rewarding* states that the user should be rewarded when a goal is accomplished.

Table 8 shows the presence or non-presence of each of the design strategies inside *Support My Exercise* dimension as well as how theses design strategies appear in SportyPlanner app.

Table 8. Appearance of design strategies inside Support My Exercise dimension.

Design strategies	Functionalities in which is present	Reflections
S1.1: Automatic tracking	Progress visualization, weight tracker, sleeping tracker.	Progress based on the workouts made, weight information and sleeping times are manually entered but automatically tracked and displayed on graphics.

S1.2: Comprehensive tracking	Workout assistant (number of sets, repetitions and weight/time for each activity)	In each of the exercises that formed the whole workout, the user can track the number of sets, repetitions and weights used or the amount of time spent depending on the nature of the exercise.
S1.3: Short- and long-term data	Progress visualization, weight tracker and sleeping tracker (graphics) Meal tracker (Food diary) Calendar. Programs monitoring.	Progress, weight and sleeping time information is recorded and kept tracked and it can be checked by the user anytime. Also, past foods as well as all the past feedback provided is kept as a diary. Inside calendar section the user can check the workout planned for the current date the past workouts that were completed or missed and the future ones. In My Programs section it is possible to see the user's current program and the previous ones.
S1.4: Goals setting	Progress visualization, weight tracker, sleeping tracker.	Goals related to progress, weight and sleeping time can be stated by the user who can keep track of them.
S1.5: Progress towards goals	Progress visualization, weight tracker (graphics) Chat feature and meal tracker (Feedback provided by the personal trainer)	The user can follow his/her progress regarding weight and improvements made by checking the graphics. Also, users who have a personal trainer can receive personal feedback.
S1.6: Acknowledging	Chat feature and workout assistant (encouraging messages given by the personal trainer and the application)	Reinforcement and inspirational messages during and after the workout given by both, the application and/or the personal trainer.
S1.7: Rewarding	Rewarding system	Users are given with badges everytime they complete a workout or reach a goal. Badges can be changed by discounts afterwards.

As it can be seen in the table, SportyPlanner app includes features that belong to all the design strategies included in Dimension 1. It includes *automatic tracking* in the progress made or semi-automatic tracking in the weight and sleeping time sections. Semi-automatic tracking means that the user has to periodically register the information regarding weight and sleeping times and then, the progress is tracked automatically and displayed on graphics. Moreover, the user can check different parameters when doing a workout and thus, the *comprehensive tracking* design strategy is also included in the design. Furthermore, all the past and present information regarding progress, weight and sleeping time is recorded and kept tracked since the user starts using the app. Also, meals eaten and all the feedback provided by the personal trainer is kept as a diary and can be checked by the user anytime. Furthermore, inside calendar section the user can check not only the workout planned for the current date, but also the past workouts that were completed or missed and the future ones. Also, in My Programs section it is possible to see the user's current program as well as all the previous programs that the user did in the past. Therefore, *short- and long-term data* is included in the application. In addition, *goal settings* and *progress towards goals* design strategies appear in the form that some of the user's common goals such as weight and progress control as well as sleeping time and meals can be stated and kept tracked by the user and users who have a personal trainer can receive personal feedback while chatting with the personal trainer or in the meals section. Moreover, the user receives periodical *acknowledgment* given by the application and/or the personal trainer. Finally, a badge punctuation system which is explained in more detail in section 4.2.11 has been designed in order to *reward* and thus, motivate users while using the app.

Dimension 2 or *Be my Advisor* aims to expand the aforementioned *Support My Exercise* dimension by adding a human touch as well as an advice-giving role to the application. This dimension includes eight design strategies: *advisory role*, *human touch*, *goals setting advice*, *planning exercises*, *guiding exercises*, *reminding*, *glimpse to the future* and *explicit spur*. First, *advisory role* refers to the fact that the application should play an active part in user's daily routines by advising and motivating them to continue doing exercise and to reach their goals. Second, *human touch* emphasizes that this advisory and motivating role should be as real and individualized as possible for each user. Third, *goals setting advice* means that it is important for the user to get instruction toward his/her goals. This instruction should be realistic and reachable but at the same time it should also be challenging and stimulating enough and with the possibility of being edited and/or changed. Fourth, *planning exercises* states that the application should offer users with complete programs and workouts which are adapted to them and their goals and which can be also editable by them. Fifth, *guiding exercises* refers to the fact that the users expect to be guided and receive feedback before, during and after the physical activity is performed. Sixth, *reminding* denotes the importance for the user of being reminded not only about specific exercises but also about the importance of doing physical activity and

the progresses that they are experimenting. Seventh, *glimpse to the future* means that it is valuable for the user to know the future benefits of doing a certain activity if the user keeps on doing it. Finally, *explicit spur* relates to the importance of remembering and giving a push to the users during inactive periods.

In Table 9 shows the presence or non-presence of each of the design strategies inside *Be my Advisor* dimension as well as how these design strategies appear in SportyPlanner app.

Table 9. Appearance of design strategies inside Be my Advisor dimension.

Design strategies	Functionalities in which is present	Reflections
S2.1: Advisory role	Chat feature and meal tracker (feedback provided by the personal trainer)	Workouts designed by the user's personal trainer as well as personalized feedback given by him/her.
S2.2: Human touch	Personal trainer feature (user's own personal trainer)	The person giving advice to the user is the user's own personal trainer.
S2.3: Goals setting advice	Chat feature (feedback provided by the personal trainer)	The personal trainer will provide the user with feedback regarding the user's own goal/s.
S2.4: Planning exercises	Workout assistant (personal workouts designed by the user's own personal trainer)	Workouts and schedule are designed by the user's own personal trainer based on the user needs.
S2.5: Guiding exercises	Workout assistant (Information regarding each of the exercises)	While the user is doing a workout, he/she has the possibility of watching a video as well as information regarding each of the exercises that formed the whole workout.
S2.6: Reminding	n/a	This design strategy is not contemplated at the moment as for now, it is supposed to be done by the personal trainer.

S2.7: Glimpse to future	n/a	This design strategy is not contemplated at the moment as for now, it is supposed to be done by the personal trainer.
S2.8: Explicit spur	n/a	This design strategy is not contemplated at the moment as for now, it is supposed to be done by the personal trainer.

As it can be seen in the table, five out of the eight design strategies included in Dimension 2 are contemplated in the design of SportyPlanner app. *Advisory role* design strategy is included as the user can receive personalized workouts and feedback given by his/her personal trainer through the app. In addition, one of the main features that characterize SportyPlanner app is that the user's own personal trainer and thus, a real human person is the one who is designing the workouts and giving advice to the user so the app includes *human touch* as well as *goals setting advice* strategies. Moreover, *planning exercises* design strategy is also present in the design of SportyPlanner app as workouts and schedule are designed by the user's own personal trainer but the number of sets, repetitions and weight in each of the exercises can be changed by the user anytime based on their feelings while doing the workout. Additionally, there is the possibility for the user to watch a video about how to correctly perform the exercises as well as important information regarding each of the exercises. Therefore, *guiding exercises* strategy is also included. Finally, *reminding*, *glimpse to future* and *explicit spur* strategies are not included yet in the design, as the personal trainer can remind, inform about future benefits and give a push to their trainees during inactive periods.

Dimension 3 or *Grow with Me* introduces design strategies that allow the application to change based in the progress made by the user and that adapt to the changing situations where the user may be exercising. *Grow with Me* dimension contains five design strategies: *evolving with progress*, *adapting to situations*, *adapting to surroundings*, *adapting to own exercises* and *adapting to performed exercises*. First, *evolving with progress* claims that users should be provided with accurate guidance, recommendations and feedback every time they are making progress. Second, *adapting to situations* means that the application should adapt to the user's changing circumstances which may provoke inactive periods as well as supporting the user when he/she starts exercising again. Third, *adapting to surroundings* refers to the fact that it is important for the user that the application can adapt to the different environments they may be and therefore, it can offer them with the appropriate kind of workout based on it. Forth, *adapting to own exercises* states that the application should also adapt to the characteristics of the physical activities that the user does in his/her own. Finally, *adapting to performed exercises* denotes the

importance of adjusting to the activities already made by the user inside his/her training program.

Table 10 shows the presence or non-presence of each of the design strategies inside *Grow with Me* dimension as well as how these design strategies appear in SportyPlanner app.

Table 10. Appearance of design strategies inside Grow with Me dimension.

Design strategies	Functionalities in which is present	Reflections
S3.1: Evolving with progress	Workout assistant (different exercise packages according to user's progress)	The type and level of difficulty of the exercises change according to the users' progress.
S3.2: Adapting to situations	n/a	This design strategy is not contemplated at the moment as for now, it is supposed to be done by the personal trainer.
S3.3: Adapting to surroundings	n/a	This design strategy is not contemplated at the moment as for now, it is supposed to be done by the personal trainer.
S3.4: Adapting to own exercises	Workout assistant (different exercise packages according to user's needs)	Depending on the interests, expectations and needs of the user, the type of exercises provided are different and personalized.
S3.5: Adapting to performed exercises	Workout assistant (different exercise packages according to user's progress and past exercises)	Depending on the previous workouts already made and the improvements made by the users, the type of exercises provided are different and personalized.

As it can be seen in the table, three out of the five design strategies included in Dimension 3 are considered in the design of SportyPlanner app. First, the application *evolves with* user's *progress* as the type and level of difficulty of the exercises are changed according to the users' progress. Moreover, the application also *adapts with* the users' *own exercises* and *performed exercises* as the user is given with different exercises packages according to the user's needs, progress and past exercises. However, *adapting to situations* and *adapting to surroundings* are not considered in the design of the application as for now, it can be done by the personal trainer who can offer different kind of exercises depending on the users' personal circumstances and/or environments.

Dimension 4 or *Utilise my Sociability* adds social stimulus to the design by allowing user to use social factors to communicate and keep in touch with others. Six design strategies are included in this dimension: *sharing*, *cooperation and competition*, *re-union*, *group formation*, *role models* and *passing forward*. First, *sharing* introduces the possibility of sharing exercise data with other people. Second, *cooperation and competition* which allows the user to choose whether he/she wants to cooperate or to compete with any other person (or oneself) to motivate him/herself while doing exercise. Third, *re-union* offers the possibility of reunion of familiar people who are not geographically close to each others with the aim of providing a source of wellness motivation. Forth, *group formation* adds the opportunity of forming a group between semi-familiar people who have similar goals. Fifth, *role models* includes the possibility of utilizing the example of famous people fitness progresses in order to motivate users to continue exercising. Finally, *passing forward* refers to the possibility of spreading exercise goals to others and/or inviting others to exercise.

In Table 11 can be seen the presence or non-presence of each of the design strategies inside *Utilise my Sociability* dimension as well as how theses design strategies appear in SportyPlanner app.

Table 11. Appearance of design strategies inside Utilise my Sociability dimension.

Design strategies	Functionalities in which is present	Reflections
S4.1: Sharing	Chat feature (communication with the personal trainer)	The user can share all the information regarding meals, weight, sleeping times, progress and feedback of each of the workouts as well as chatting with his/her personal trainer through the app.
S4.2: Co-operation and competition	Progress monitoring (competition with oneself)	For now, only the competition with oneself is contemplated as the user can check his/her progress along time.
S4.3: Re-union	n/a	This design strategy is not contemplated at the moment.
S4.4: Group formation	n/a	This design strategy is not contemplated at the moment.
S4.5: Role models	n/a	This design strategy is not contemplated at the moment.

S4.6: Passing forward	n/a	This design strategy is not contemplated at the moment.
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As the table shows, two out of the six design strategies in Dimension 4 has been contemplated in the design of SportyPlanner app. *Sharing* as it is possible for the user to communicate and share all the information regarding the his/her progress (workouts, meals, weight, etc.) with the personal trainer. Also, *competition* with oneself is possible as the user can check his/her progress along time. Finally, the rest of the design strategies in this dimension has not been included in the design of SportyPlanner app as they have not been considered as relevant as the others so that the application provides the user with the features he/she is expecting to find in such a kind of application.

Dimension 5 or *Keep Me Engaged* includes design strategies that deal with maintaining the motivation of the user in regard to the use of the fitness application. It contains four design strategies: *new features and content*, *surprises*, *playful features* and *levels*. First, as its name implies, *new features and content* refers to the fact that the application should provide different and original features and content every now and then so that the user does not get bored while using the application. Second, *surprises* means that the application should include features that surprise the user in a positive way. Third, *playful features* implies the inclusion of playful elements such as visualizations and rewards. Finally, *levels* refers to the use of different phases or stages with different and new challenges in each of them in order to keep the users engaged.

Table 12 shows the presence or non-presence of each of the design strategies inside *Keep Me Engaged* dimension as well as how these design strategies appear in SportyPlanner app.

Table 12. Appearance of design strategies inside Keep Me Engaged dimension.

Design strategies	Functionalities in which is present	Reflections
S5.1: New features and content	Online shop. Workout assistant (new programs provided by the personal trainer) Rewarding system.	Lot of new programmes for the user to buy at the online shop. Also, personal trainers change periodically the exercises of his/her trainees. Moreover, the users can get different discounts or even items and/or training packages for free when performing the training successfully.

S5.2: Surprises	n/a	This design strategy is not contemplated at the moment.
S5.3: Playful features	Rewarding system.	Users are given with badges everytime they complete a workout or reach a goal. Badges can be changed by discounts afterwards.
S5.4: Levels	n/a	This design strategy has not been designed at the moment.

As it can be seen in the table, three out of the five design strategies are covered in the design of SportyPlanner app. *New features and content* are periodically provided to the user inside the online shop section in which there are plenty of new programmes which are updated every now and then and also the different programs provided to the user by his/her personal trainer based on the user's progress and needs. *Playful features* is also present in the design of the application inside the badge punctuation system design which is explained in more detail in section 4.2.11.

Dimension 6 or *Visualise My Exercise* relates to the presentation and visualization of the information regarding physical exercise which has to be detailed, specific, comprehensible and eye-catching to the user. This dimension contains four design strategies: *wellness experience*, *beyond numbers*, *familiar and real-life metaphors* and *beauty*. First, *wellness experience* aims to allow the user to express their own and personal feelings, perceptions, opinions and explanations regarding each of the performed workout or exercise. Second, *beyond numbers* states that the data regarding the progress made that can be visualized in the application should be shown not only in a numerical form but also using another non-numerical approaches. Third, *familiar and real-life metaphors* means that the application should utilize metaphors and descriptions that are familiar to the user. Finally, *beauty* refers to adding some appealing elements to the design of the application with the aim of compensating the lack of natural beauty indoors.

In Table 13 can be seen the presence or non-presence of each of the design strategies inside *Visualise My Exercise* dimension as well as how theses design strategies appear in SportyPlanner app.

Table 13. Appearance of design strategies inside Visualise My Exercise dimension.

Design strategies	Functionalities in which is present	Reflections
S6.1: Wellness experience	Meal tracker (pictures of the meals and notes) Workout assistant (observations and opinions after each workout)	Users can write descriptions and express personal opinions and feedback regarding meals and the workouts already made.
S6.2: Beyond numbers	Progress monitoring, weight tracker and sleeping tracker (graphics)	Users can see not only numerical but also graphical information regarding progress, weight and sleeping time.
S6.3: Familiar, real-life metaphors	Workout assistant (explanations of each exercise)	Textual descriptions are easy to understand as familiar words and explanations have been used.
S6.4: Beauty	n/a	This design strategy is not contemplated at the moment.

As the table shows, three out of the four design strategies included in dimension 6 are considered in the design of SportyPlanner app. *Wellness experience* is included as it is possible for the users to express personal opinions and feedback regarding the meals that they have eaten and sent to the personal trainer and regarding the workouts already made. Also, users can not only see numerical information regarding their progress, but also graphical information that allows them to follow the progress throughout the time and thus, *beyond numbers* design strategy has also been considered. Finally, each exercise that formed the workouts has not only a video showing how to perform the exercise, but also a textual description about the exercise, how to perform it, benefits of doing it, the muscle/s it works, etc. This description is easy to understand as it uses familiar words and explanations.

5.1.2.1 New design strategies proposal

Once all the design strategies proposed by Ahtinen (2015) have been studied and their presence in SportyPlanner have been evaluated, the researchers of this thesis work have realized that there are some features included in SportyPlanner app that do not belong to any design strategy already defined.

First, a design strategy called *Visual Support* could be added to Dimension 1. It refers to the possibility of including audio and video visualization and display while doing the workouts as it is very important, especially for beginners, to have not only a good textual explanation about how to correctly perform each of the exercises, but also to have the possibility of watching the movements performed by an expert and listening to their explanation at the same time. As well as helping the user on how to correctly perform the movement, it also helps to prevent injuries that can occur if the movement is not correctly understood and performed.

Second, another new design strategy called *Tracking Diary* could be added. This design strategy would be a combination between *short- and long- term data* and *wellness experience* design strategies as it aims to allow the user having track of not only recent data, but also the past one and at the same time, this data has been created by the users expressing their own and personal feelings, perceptions, opinions and explanations as well as pictures. In SportyPlanner app this design strategy can be seen in the *Meals Diary* that the user creates when sending the meals to the personal trainer. All those meals are kept as a diary in the app and they include the picture of the meal, an explanation written by the user as well as all the feedback and rating provided by the personal trainer afterwards.

Finally, a new design strategy called *Information Edit* could be included. It means that there should be a possibility for the user to change some information related to the workouts if he/she needs to. An example of this design strategy in SportyPlanner is the possibility to change how many sets, repetitions and weights have been done by the user in each of the exercises that formed the workout. Another example that is not included yet in the design of SportyPlanner app but could be added in the future, is the possibility for the user to make changes in the calendar and change the dates of the workouts if the user cannot do a workout on a specific date but he/she does not want to miss it.

5.2. User-based evaluation

The evaluation of SportyPlanner prototype consisted on a single meeting with each of the participants. Each of the meetings lasted for around 30-40 minutes. First, a background questionnaire was given to the participant. This background questionnaire was intended

to collect general information of the users such as demographics and data regarding smartphone usage. Second, the usability test was performed. In the usability test, specific tasks to be performed by using the SportyPlanner app high-fidelity prototype provided were given to the participants. After that, an interview containing questions about general information as well as the use of SportyPlanner and motivation on using the app was done. Finally, a user satisfaction questionnaire regarding the use of the prototype during the usability test was filled by each of the participants.

5.2.1. Usability test

The usability test consisted in the performance of 12 tasks that were given to the participants. Firstly, they were asked to think aloud during the whole test so that the researchers could know what the feelings of the participants were all the time. After that, the participants were given one by one with pieces of paper containing each of the tasks to be performed.

One of the objectives was to conduct the tests in the same way and during the same circumstances by using the same tasks for the participants and that is why all the tests were run on an iPhone 6S provided by the researchers and the whole process was recorded with InVision (InVision, 2016) and Lookback (Lookback,2016). With the help of this software, not only what was happening in the screen was recorded, but also the audio and video of the participant's face to capture all the needed information such as feelings and thoughts as well as visual expressions were recorded.

The usability test had two main purposes. The main purpose was to allow the participant to familiarize with the whole app and to discover all the features and possibilities that it can offer. Additionally, the second purpose was to find some usability problems in the design of the user interface as well as verify whether the users find the design of the application acceptable or not. A description of each of the tasks as well as their purpose can be seen in Table 14.

Table 14. Tasks given to the participants in the usability test.

Task	Purpose
1. Login in the app and take a look at the home screen. Describe what you see on the view and what thoughts, comments and feelings it evokes on you.	To allow the participant to familiarize him/herself with the main screen of the app and at the same time for us to gather valuable information regarding what the participant think about the user interface at first glance.
2. Find the options that allows you to edit your profile information. Imagine you save the changes and go to the home screen.	To allow the participant to identify where are the basic options of SportyPlanner app placed inside the app.

3. Enter the message section and see what Jarmo wrote to you. Then, go to the home screen.	To let the participant find how he/she can communicate with his/her personal trainer by using the app.
4. Go to the weight section and imagine you add your weight. Then, go the home screen.	This task has two main purposes. First, to allow the participant to discover where the advance features of SportyPlanner app are placed inside the app. And second, to familiarize him/herself with the way of entering information regarding his/her weight in the app.
5. Go the meal section. Imagine you are about to have salad for dinner, send a picture of the meal to your personal trainer.	To allow the participant to learn how to share meals with the personal trainer.
6. Check if there is new feedback provided by your personal trainer in the meal list of May 23rd. Then, go the home screen.	To allow the participant to learn how to find and check the feedback provided by the personal trainer.
7. Imagine today is of May 23rd. Enter the calendar section and find out the summary of your workouts, meals, etc. After that, go to the home screen.	To allow the participant to find where the calendar section is placed in the app and how he/she can utilize this feature.
8. Now start the Resistance workout. Complete each exercise until you are done with the whole workout. Then go the home screen.	To allow the participant to learn how to follow a workout with the guiding of SportyPlanner app. And also, to learn about the rewarding system of SportyPlanner app.
9. Go to the online shop. Check which programs are suggested for you and buy the first one which is called “Bodyweight training”. Then, go to the home screen.	To allow the participant to find where the online shop is situated and how he/she can buy other programs different from his/her current ones.
10. Now you want to ask for more information and get in touch with another personal trainer different from your current one. Go to the Personal Trainers section, search for Luis Enrique and send him a message. After that, go to the home screen.	To let the participant discover how he/she can look for other personal trainers and get in touch with them in case he/she wants to change the personal trainer or hire another one.
11. Now you have to register how many hours you have slept during the night. After it, go to the home screen.	To allow the participant to familiarize him/herself with the way of entering information regarding his/her sleeping time in the app.
12. You have just finished using the app for today so log out from it.	To test whether the participant has any problem to log out from the app.

As it can be seen in the table, all the tasks were straightforward and achievable and at the same time, they allowed the participant to learn about all the features and functionalities available in the app.

5.2.2. Interview

After the usability test, the researchers conducted an interview with the participants. The purpose of the interview was to get direct feedback from the participants concerning the experience of using SportyPlanner app and the experience of participating in the usability test as a whole as well as gathering general information and information regarding motivation aspects while using the app. All in all, with the interviews the researchers got information such as a general evaluation of the product, experience, preferences, impressions, attitudes, expectations, wishes, etc.

The interview conducted was a semi-structured one, which means that even though it had a list of pre-specified themes to be covered during the interview, at the same time it was flexible enough to allow us to ask follow up questions in case an interesting topic came out. According to Cohen & Crabtree (2006), if correctly performed, semi-structured interviews can provide reliable, comparable qualitative data. Therefore, using a semi-structured interview allowed the researchers to focus the interview so that the adequate and suitable information was found.

The three main themes covered during the interview were:

- General information.
- Use of SportyPlanner app.
- Motivation to use the app and motivation in general.

First, general information of the participant was asked. It included aspects such as the frequency of training, the use of mobile phone while doing exercise at the gym as well as the way the participants follow their progress and the problems that they have while doing it.

Second, questions about the use of SportyPlanner app during the usability test aimed to discover what the participant's feelings and thoughts about using the app were as well as what features they like most or they do not like and whether there are features that they would remove from the app or there are new ones that they would add.

Finally, questions related to motivation in general and while using the app were intended to discern what aspects motivate the users so that they want to continue using the app in the future.

Interview questions can be found in Appendix 2a.

5.2.3. Background and user satisfaction questionnaires

Two types of questionnaires were utilized during the meeting with the participant. At the beginning of the meeting, a background questionnaire was asked to be filled in for the participant. Also, before the end of the meeting, a user satisfaction questionnaire was given to the participant.

The background questionnaire aimed to collect general information of the participants such as demographics and data regarding smartphone usage. It was composed by a combination of open format questions in which the participants can express their own opinions and closed format questions in which the participants have to choose one or more of the multiple choice answers given.

The user satisfaction questionnaire was intended to gather the perceptions and opinions that the participants had regarding the use of the prototype during the usability test. This questionnaire uses Likert-type data with a five point scale (Strongly disagree, Disagree, I don't know, Agree, Strongly agree) which allows the participants to express how much they agree or disagree with each statement (McLeod, 2008).

Both questionnaires can be found in Appendix 2b and Appendix 2c.

5.3. Users and contexts of use

SportyPlanner app is mainly intended to be used by two types of users, end users who are using the services of a personal trainer and end users who go on their own to the gym and therefore have no assistance of a personal trainer.

In order to gather information from several points of view and have the best possible design, personal trainers were also considered in the sample. A total of 16 people were considered for the user test. The original idea was to have 10 end users and 5 personal trainers, but it turned out to be 11 end users because some of them confirmed and cancelled the appointments several times.

The personal trainer is responsible for identifying the end user/trainee problems and preparing a plan for their well-being. The end user is a person who is willing to undergo physical training to build-up his/her strength and fitness. The end user is generally an adult who can be either, male or female. Their occupation can vary greatly as they come from diverse backgrounds. The personal trainer is a person who prepares a training plan in order to create an exercise schedule for the end user. Trainers are professionals in their

field, including certified doctors and master degree students, with many years of experience. Another characteristic of the trainers is their skill in designing a plan that meets the budget constraints of the customer. The sample of personal trainers consisted in two instructors of group exercises classes and three personal trainers who work at different gyms in Tampere

The sample of end users varied greatly, however many of them are from Finland and the rest come from different countries. End users are those people who are fitness enthusiasts, athletes and regular users of the gym.

All the participants were asked to fill a background questionnaire in order to gather demographic information such as gender, age, level of studies, occupation, and use of smartphone, among others. As it can be seen in Figure 20, from the total of 16 participants interviewed, 19% are male and 81% were female. Women were more accessible and willing to participate in this study.

As it can be seen in Figure 21 the study focused on gathering more end users (69%) than personal trainers (31%). In an ideal scenario the mobile application would be used by people that have the services of a personal trainer, yet it represented a challenge to contact people who have a personal trainer, speak English and are willing to participate in the test. 25% of the participants were end users who had the services of a personal trainer during the time of the study and 44% of the participants were end users that assist to a gym or do physical activity on a regular basis but have no personal trainer. The reason of having more end users is that the mobile application SportyPlanner was designed for the end user and therefore their opinion is vital and very valuable. However, personal trainers were also interviewed to consider their opinion regarding the usage of the mobile application.

In Table 15 it can be seen that the nationality of the participants varies greatly, however 53% of them were Finnish due to conducting the user test in Finland. The next two big groups correspond to Mexican (17%) and Spanish (12%) participants. Since the mobile application was designed in English language, only one participant from the sample had some difficulties understanding the language.

Table 15. Participant's nationality.

Nationality	Percentage
Argentina	6%
Belorussia	6%
Finland	53%
Malaysia	17%
Mexico	6%
Spain	12%

As shown in Figure 20 the majority of the participants (81%) said to have good usage skills of smartphones. This question was very important since not being familiar with smartphones could affect the outcome of the user test because it includes interacting with the prototype.

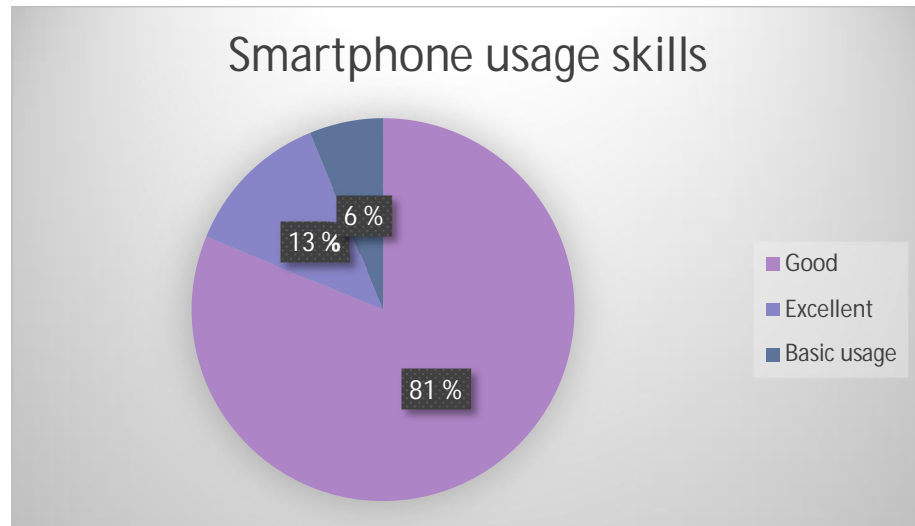


Figure 20. Smartphone usage skills.

5.4. Results

5.4.1. Usability problems

This section contains the most common usability problems found while performing the usability tests. These issues are considered as main usability problems because they were encountered more frequently during the tests.

Problem 1. The icon to add a new meal in the meal section is not intuitive. The task of taking a picture of a new meal and send it to the personal trainer is confusing because the icon shows an add symbol. *Solution:* Use a camera icon that clearly shows that it is possible to take a picture.

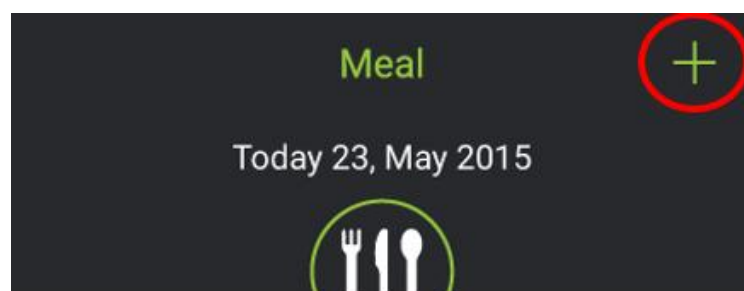


Figure 21. Plus icon in the meal section.

Problem 2. The feedback icon in the meal section is too small and not intuitive. When checking a meal's feedback provided by the personal trainer it is difficult to identify the proper icon. *Solution:* Use a proper feedback icon and increase its size.

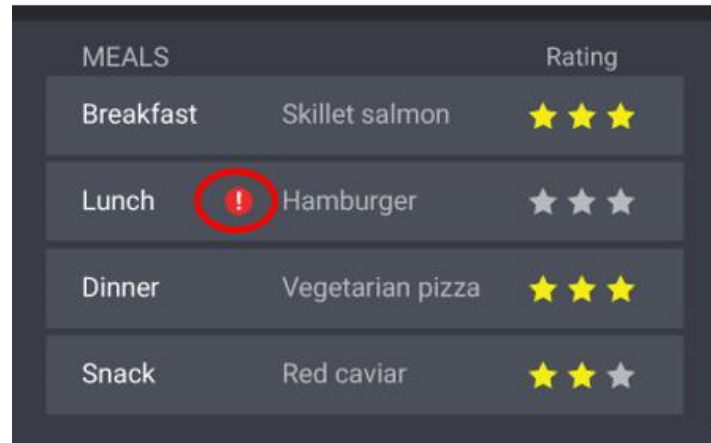


Figure 22. Feedback icon in the meal section.

Problem 3. The month view of the calendar section contains too much information. When entering the month view in the calendar section there are many colors and information for the user. *Solution:* Remove the summary at the bottom and use solid circles only.

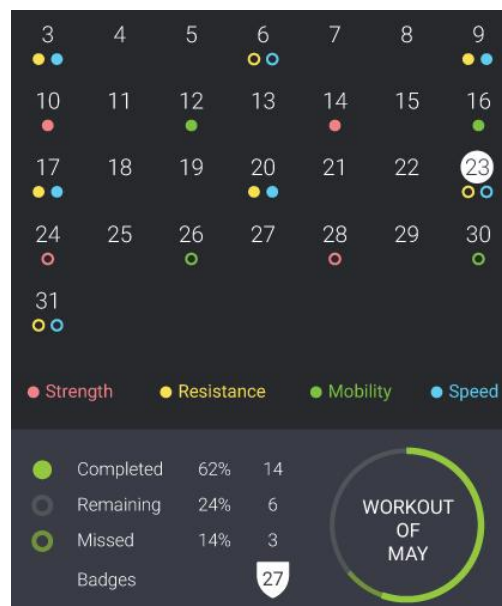


Figure 23. Month view of the calendar section.

Problem 4. The information of the summary of the month view in the calendar section does not indicate if it is related to a specific day or to the whole month. The summary shown at the bottom of the month view of the calendar section confuses the user about what information is displayed there. *Solution:* Show the summary of the month in another sub-section of the month view.

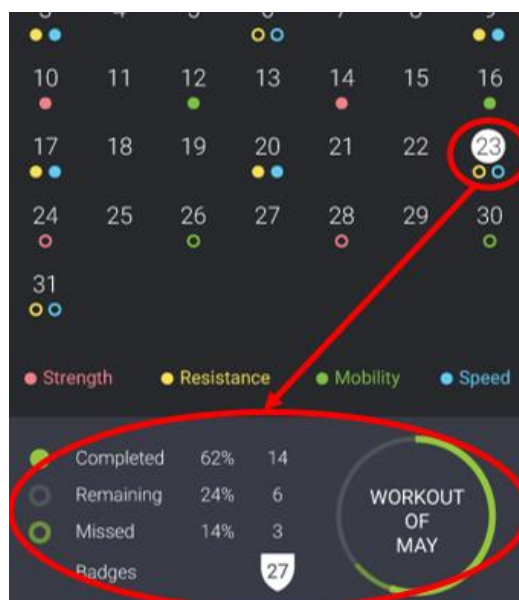


Figure 24. Information of the summary of the month view in the calendar section.

Problem 5. The extra-features icon of the bottom menu is not intuitive according to what the user can find inside of it. The central icon of the bottom menu is too generic as to what kind of options are there available to the user when they click on it. *Solution:* Iterate the icon to find something more meaningful to the user.

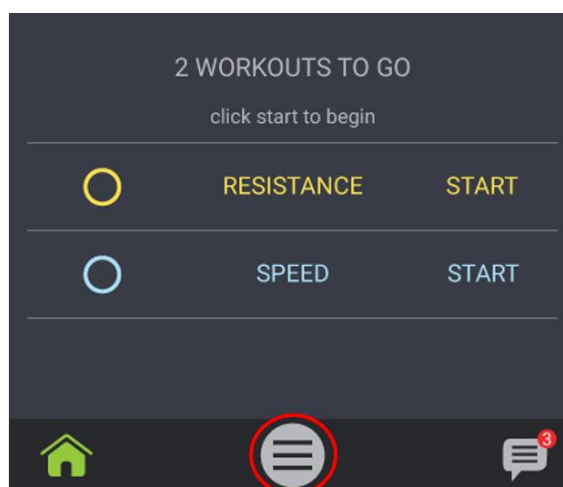


Figure 25. Icon in the bottom menu.

5.4.2. Interview results

All the information and data obtained during the interviews was analyzed and organized by creating an affinity diagram. The affinity diagram allowed us to sort all the data into logical groups and therefore, to identify and group different patterns. The four main groups that were identified are explained in the next four subsections.

5.4.2.1 Gym related findings

The most important information encountered within this heading was about the problems users encounter while tracking their progress. In addition, the usage of mobile phone at the gym was analyzed.

· Problems at the gym

Most of the interviewed participants go periodically to the gym. Therefore, one of our main aims was to find out which kind of problems do the participants have when training as well as what is the mobile phone usage at the gym.

“I have problems with the paper and the workout program. I have to carry the paper around the gym”

End user, female, 29 years

The most common problem found is that nowadays users have to take a paper and a pen with them to the gym in order to know which exercises they have to perform as well as the weights they use in each of them. Five of the end-user participants stated that this is a problem for them because it is very uncomfortable as they have to take care of not losing the paper in the gym. They also consider that they waste time in writing or taking notes.

Moreover, two end-user participants claimed that their main problem is that they do not know whether they are making progress or not, either because they do not know how to measure the progress or they are lazy to write all the information down after each exercise.

“I don’t know if I’m making progress”

End user, female, 25 years

“I am lazy to monitor my progress properly”

End user, male, 30 years

On this matter, personal trainer participants share the opinion with end-user participants. Their general opinion is that it would be easier for their clients to have an application which helps them to follow the workouts as well as to check their progress.

Another finding was that communication through the application with customers was remarked as very important by the personal trainers. Currently they communicate with customers via e-mail, messages or phone calls but they claimed that this mean of communication can be annoying as they receive e-mails and messages at any time during the day and/or night, and therefore, it is difficult to disconnect from work.

"At the moment my customers don't use any application to help them following their workouts. They carry their papers, and then when they want to ask something, they call me or send me a message"

Personal trainer, female, 39 years-old

- **Use of mobile phone at the gym**

Regarding the use of the mobile phone at the gym there was disparity of opinions. Half of the end-user participants stated that they do not use the mobile phone at the gym while the other half affirmed that they use the mobile phone mainly to listen to music or to check videos on how to perform the exercises in the internet. Only two of the end-users declared to use some other fitness applications.

5.4.2.2 Users related findings

The main themes that were addressed during the interview were how often the participants train, what their goals are and how the participants track their progress. Additionally, the interview aimed at discovering the factors that would motivate the participants to use SportyPlanner app.

- **Training**

Participants were asked regarding the frequency of their workouts in order to better know the profile of the potential users of the application. Among the end-user participants, two different groups of users were identified. The first group is composed by end-users who train several times per week either at the gym or at home. The usual number of times that they train vary from two to five times a week. The second group is composed by occasional end users who only train twice or three times a month.

- **User goals**

User goals while exercising always depend on the person. However, there have been two most common goals found during the interview. Those goals have been losing weight and gaining muscles or being stronger, with five participants stating each of them. The rest of the end-users as well as the personal trainers claimed that they train in order to keep them active and maintain themselves.

- **Tracking progress**

During the interview, we put special focus on finding how users tracked their progress in order to discover what the most important features that users value the most when tracking their progress are.

Four end-user participants stated that they see their progress by periodically increasing the lifted weight while performing the exercises. Therefore, they believed that they would be more motivated to use the application if there is the possibility of keeping track of the lifted weights. Also, two end-user participants considered useful to check the progress in a graph or charts as the information would be very intuitive and easy to follow.

In addition, two end-user participants mentioned that they control their corporal weight in order to check their progress. And thus, having a feature that allows monitoring and keeping track of the weight in a fitness application is essential.

Moreover, personal trainer participants agreed with end-user participants in having a feature that allows to keep track of different measurements.

"We (the personal trainer and the customer) talk about it (the progress) and we use measurements (e.g weight tracking)"

Personal trainer, female, 39 years-old

Furthermore, personal trainer participants agreed that having a calendar and the possibility of setting up the days that their customers have to train as well as knowing how many days have they trained during the week is also an important feature to be included.

PT: "I consider more important to check how many times my customers are doing exercise"

Personal trainer, female, 25 years-old

· **Motivational factors**

In order to find strengths and weaknesses in the design of the application, all the participants were asked about what are the main reasons why they would use SportyPlanner app while exercising. The majority of the participants, both end-users and personal trainers, stated that one of the best things in SportyPlanner app is that there is everything that people who train would need to focus on (workouts, chat with the personal trainer, progress, meals, etc.) altogether in the same application.

“Having all these features in one app would make me use it”

End-user, female, 25 years

“There are some customers who use an app for the training and an app for the food. So I like an app in which there is everything.”

Personal trainer, female, 39 years-old

Moreover, all the end-user participants considered that having the possibility of communicating with a real personal trainer through the app is a great motivating feature to continue using it. They stated that having a real person giving the user advice is important as they feel they are receiving personalized information based on their own needs instead of generic information, which may be the same for every user.

Also, most of the end-user and personal trainer participants claimed that they would use the application because they can easily input the progress and all the relevant information and check it afterwards. Having a diary of what progress they are experimenting while performing a workouts is not only helpful in order to know what should be improved but also motivating.

“I would use the app to check my progress, the most important feature”

End-user, male, 29 years

“It was motivating because it's easy to use, and it's easy to put everything there, like all the information, so that you can check it later on”

Personal trainer, female, 25 years-old

Finally, other features that were considered important by the participants were having a calendar and the feasibility to schedule the workouts as well as the possibility of following

the workouts in real time so that it is known what exercise has to be done (including the number of sets, repetitions and weights) as well as the previsualization of the instructions and videos so that the exercise is correctly performed.

5.4.2.3 Application related findings

The majority of the participants liked SportyPlanner app as they agreed that all the functionalities and features were very intuitive and easy to use. One of the most liked features was having the user's own personal trainer behind the app and the possibility of communicating in real time as well as to get feedback from him/her with five of the participants stating it.

Moreover, five end user participants claimed that the meal section is one of the best features as it allows to control what is eaten daily and to get feedback regarding the meals from the personal trainers. In addition, the meal section was also very appreciated by the personal trainers.

"I especially like the food system because customers do the exercises, but eating is also a big problem"

Personal trainer, female, 39 years-old

Also, the meal section has been designed so that it is very easy for the users to include their meals by taking a picture of the meal and uploading it to the application instead of having to search the eaten meal from a list of foods. This idea was also very well valued by both, end users and personal trainer participants.

"It's easier and better to take a picture of the food instead of having to search the food from a list"

Personal trainer, female, 39 years-old

Other features that were considered to be very positive and motivating were having statistics and graphics to follow the users' progress, the importance of having videos and pictures that explain how each of the exercises have to be performed and the organization of the application in which the most important options are focused in the plus button located in the middle.

Other topics such as sleeping, online shop, badge rewarding system, preferred items for discounts, new functionalities, sociability and problems with the application were discussed during the interview as well.

- **Sleeping section**

Sleeping, together with exercising and nutrition, are the three key aspects for athletes and people who want to maintain fit. It is scientifically demonstrated that sleeping is completely necessary for an optimal physical and mental health. According to the National Sleep Foundation (Hirshkowitz et al., 2015) an adult requires seven to nine hours of sleep each night in order to improve health and well-being.

The sleeping section was very high valued and appreciated specially by the personal trainer participants. They considered this section important because it allows their customers to have an idea and/or understand why they are feeling tired and thus they have not performed well while doing the exercises. Moreover, a personal trainer claimed that it is also a good feature because if customers have to write the hours of sleep down for the personal trainer to check, they tend to sleep more.

"I think is very useful to put the sleeping hours and everything like that because then you can really check out if the training is not that good. Also, there were that smiley faces and stuff, then you can check 'why it didn't go so well'? Then you can check 'ok, well, I slept only 5 hours, that's why'"

Personal trainer, female, 25 years-old

- **Online shop**

The online shop feature was one of the less liked features. Some of the participants stated that they feel that having an online shop in which the user can buy additional workouts is not very important for them. Instead, they prefer to get only the workouts that their personal trainers have specifically created for them.

- **Badge rewarding system**

The badge rewarding system was generally liked by the majority of end-user participants. They stated that it would definitely motivate them to continue using the application if they can obtain good discounts. However, personal trainer participants were more sceptic about it. One of the personal trainers suggested that even it could be a good idea, it cannot be the main motivational system of the application. Other personal trainer claimed that the rewarding system can be stressful for the users as they would try to get as much points as possible in order to obtain bigger discounts. Finally, other personal trainer opined that the rewarding system would be more useful for companies who can advertise their products than for the final user.

- **Preferred items for discounts**

Participants were also asked about for which products they preferred to obtain discounts. The most preferred one was sport items like clothes, shoes and accessories with six participants agreeing on it. The second most preferred product was the possibility of getting special prices with the personal trainer such as discounts in their tariffs or free sessions with them. Finally, other products that were mentioned were discounts in protein and healthy food and in the price of the tickets in sport events.

- **New functionalities**

Participants were also asked about which other features apart from the ones that are already included in SportyPlanner app they would add. From their answers, we obtained a lot of interesting and good ideas for further design and future work.

First, two participants claimed that they would like to have music while working out and thus, having a feature that allows the application to connect with their playlists would be essential for them.

Regarding the workouts and exercises, a user stated that having a feature that tracks the steps and distance while walking would be a good idea. Also, having the possibility of changing the order of the exercises during the guided workouts was a request for another participant.

Related to the meal section, another participant said that a good feature would be adding the calories of each of the foods and comparing them to how many hours of exercising are equivalent to. Therefore, it would be easier to have a control of how many calories to consume and how many hours of exercise need to be done in order to compensate them.

Finally, another recommendation was adding the input of the different measurements of the body and the possibility of following the progress of those.

- **Sociability**

Sociability has been another topic that was discussed during the interviews with the participants. There were divided opinions about it as half of the participants stated that having such functionality would turn the application more motivating for them while the other half preferred not to share their workouts or progress. In this regard, it is worth mentioning that the majority of the participants who were not aiming to share their information in the social networks were mainly Finnish participants, while the ones willing to have the possibility of sharing content were all foreign ones.

"I would maybe add some interaction with others. Sometimes it's funny to share a picture"

Non-Finnish personal trainer, female, 31 years-old

It was also proposed to add the possibility of knowing if there are more people in near locations who are also using the application in order to get in touch with them and find and/or create a community of users.

Competition with others was another topic that was discussed with the participants. Regarding this, there were also different opinions. Among the end-user participants, all of them agreed that having the possibility to compete with somebody else would be entertaining and thus, motivating. However, they all also stated that they would only compete with people who they know beforehand such as family and/or friends who are living far away. On the other hand, among the personal trainer participants there were divided opinions. Two of them claimed that people who are not professional athletes should not compete between them because each person is different from the other and the type of exercises which are good for one person may not be good for the other and thus, the possibility of getting injured while competing with other increases significantly. However, three personal trainers asserted that it would be useful to have a feature that allows them to reunite their training groups and maybe to have the possibility of competition among the persons within these groups.

"I don't think competition with other is a good idea because everybody should concentrate on their own workout, not to compete with others, because people are different shape also"

Personal trainer, male, 41 years-old

"I have those small group training groups (6 to 10 persons) who workout together, so maybe in that kind of group it would be good because they can compete together and share the things"

Personal trainer, female, 39 years-old

· Problems with the app

Even though the trial of the prototype during the usability test went quite smoothly for all the participants, several issues with some of the features arised.

The most common problem, with five of the participants stating it was that when they had to add a new meal in the *meal section* or a new sleeping time in the *sleeping section*, they had trouble to find the plus (+) button which is currently situated in the top right corner

of the screen. Most of them were expecting it to be bigger and situated somewhere in the middle of the screen so that it is more visible.

Also, two participants had trouble in localizing the feedback given by the personal trainer within the meal section. They claimed that maybe the icon that has been used is not very explanatory as they thought it looked like a warning icon indicating an error.

Furthermore, two participants stated that the meal section and the calendar section had a lot of information and therefore could be confusing and difficult to find the information needed.

Finally, even though all the participants agreed that their overall experience while using the SportyPlanner app prototype was satisfactory as it is quite simple to use, some of them claimed that as it was the first time that they checked and used the application, they had to think and try to figure out where to find each of the features. However, they also said that they knew that as soon as they get more used to the application, they will know where to find all the features faster and easily.

5.4.2.4 Personal trainer related findings

The feature that participants liked the most by unanimity was that there is a real personal trainer behind the app and thus, users get personalized workouts and feedback from a person who knows them and their physical condition as well as their goals while exercising. Several reasons about why this feature is important and motivating were stated by both, end-user and personal trainer participants.

First, all end-user participants coincided in the fact that it is very useful to have a personal trainer behind the application because he/she controls the user progress and changes the workouts periodically so that the user can make real progress. Moreover, the personal trainer can suggest the user different exercise options. This can lead into an increase of the motivation of the user to continue using the application as the user does not get bored of always performing the same exercises. Also, it was mentioned that having a personal trainer behind the application may be cheaper than having a personal trainer with you at the gym and thus, more people would be interested not only in using the application but also in hiring a personal trainer, which is beneficial for the personal trainers as well. However, regarding this, one of the participants pointed out that it is important to meet the personal trainer in person, at least for the first time. Finally, this feature turned to be very important for end-user participants because whenever they have a specific doubt, they know they have someone to ask through the application.

To sum up, a quote that summarizes the importance of this feature was stated by one of the personal trainers and agreed by all the other participants:

"I think it's really motivating if you know that someone will check, and you have to put everything there because someone will check it"

Personal trainer, female, 25 years-old

5.4.3. User satisfaction questionnaire results

A satisfaction questionnaire was used in order to collect information of the participants' experience while using the SportyPlanner prototype. All the information gathered has been analyzed in order to obtain a quantitative analysis about the users' opinions and perceptions after using the application.

As it can be seen in Figure 26, from the total of 16 participants, 14 agree that they understood how to track their workout, 13 agree that performing the tasks while using the application was easy, 12 that the use of the application was fluent and 9 that they always knew their location within the application. Finally, 7 strongly agree and 8 agree that the home screen of the application was easy to understand.

Considering the possible negative experience the participants could have had, from the total of 16 participants, 10 strongly disagree that using the application was frustrating, 10 disagree with the application including terms and words that were unfamiliar to them and 8 disagree that it was difficult to understand the structure of the application.

Finally, a total of 10 participants stated that they agree or strongly agree with the idea of using SportyPlanner app in the future.

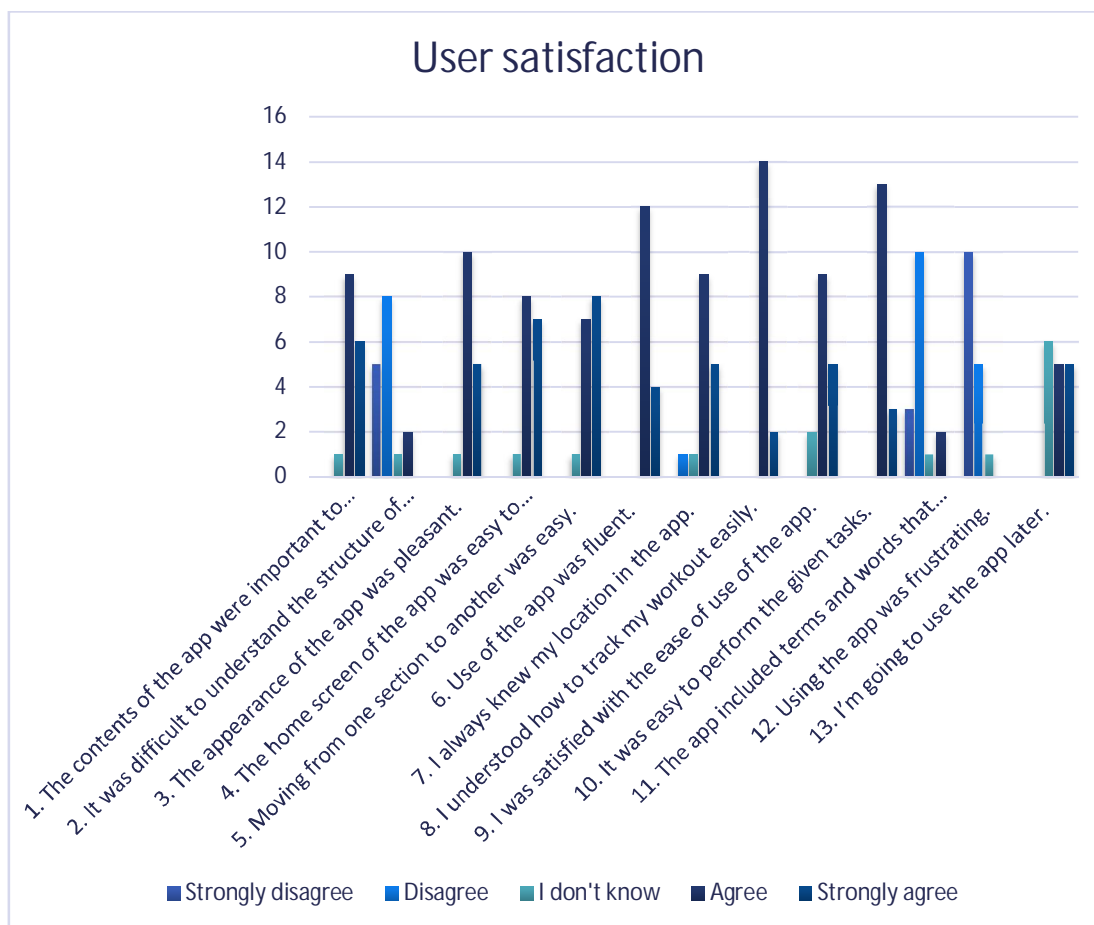


Figure 26. Results obtained in the user satisfaction questionnaire.

According to Boone & Boone (2012) Likert-type data should be analyzed by using the median or mode in order to find the central tendency of each of the statements. Therefore, the median for each of the statements have been calculated as it can be seen in Table 16.

Table 16. Median results.

Statements	1. Strongly disagree	2. Disagree	3. I don't know	4. Agree	5. Strongly agree	Median
1. The contents of the app were important to me.			1	9	6	4
2. It was difficult to understand the structure of the app.	5	8	1	2		2
3. The appearance of the app was pleasant.			1	10	5	4

4. The home screen of the app was easy to understand.			1	8	7	4
5. Moving from one section to another was easy.			1	7	8	4,5
6. The use of the app was fluent.				12	4	4
7. I always knew my location in the app.		1	1	9	5	4
8. I understood how to track my workout easily.				14	2	4
9. I was satisfied with the ease of use of the app.			2	9	5	4
10. It was easy to perform the given tasks.				13	3	4
11. The app included terms and words that were unfamiliar to me.	3	10	1	2		2
12. Using the app was frustrating.	10	5	1			1
13. I'm going to use the app later.			6	5	5	4

As it can be seen, all the statements that contemplate the positive aspects of the app (i.e. the contents of the app were relevant, the use of the app was fluent etc.) were satisfactory for the participants as all the medians are situated in the “*Agree*” or “*Completely agree*” options. The most positive result was that moving from one section to another inside the application was very easy for almost all of the participants. This means that the efforts on designing an app that is easy to understand and to use by the target users were met.

Regarding the statements that contemplate the negative aspects of the application (i.e. understanding the structure of the app is difficult, the app include unfamiliar terms etc.) the results were also positive as the median is situated in “*Disagree*” or “*Completely disagree*” options. The best result was that most of the participants completely disagree that the use of the application was frustrating.

All in all, the overall results were positive even though there is still room for improvement, especially in the refinement of the structure of the application.

6. DISCUSSION AND CONCLUSIONS

6.1. Summary of findings

These findings are based on the observations of the end users' and personal trainers' performance with the mobile application prototype, think-aloud comments and the interview and questionnaire responses.

Positive findings concern mainly the use of the prototype and also regarding the usability test conducted with the participants. The main finding is that many participants found SportyPlanner app very easy to use and think it is intuitive. One of the participants said that.

“SportyPlanner was simple to use, of course the first time you have to think what is the whole screen and where to find each feature, but then after one time you know that you will find it here”.

End user, female, 25 years

Another positive finding is that the effort put into designing features that allow constant and detailed communication between the personal trainer and the end user were right design decisions because those features were appreciated by the participants.

Having many features in one application was also a right design decision because it not only allows end users to focus on the main aspects of the mobile application which are the tracking of the workout, communication with the personal trainer and tracking of their own progress, but also it allows them to have detailed information about their health and well-being with the supporting features such as the weight and meal tracker and the other sections. In particular, some participants found quite useful to just send a picture of the meal to the personal trainer instead of taking a lot of time to inform them about their eating habits and diet.

The visual design of the mobile application was done according to the company requirements and at the same time it attempted to refresh the image of the company. This turned out to be another positive finding since end users and personal trainers found the colors, images and graphics used to display the information quite enjoyable.

Negative findings concern the problems participants had while interacting with the prototype or some of its elements. One of the most mentioned issue of the application was understanding how to add a picture of the meal and send it to the personal trainer. It seemed that the participants were not familiar with the use of the plus icon and adding a

picture of the meal. Perhaps some guidance was needed. It is also true that this happened only the first time the user was trying to figure out this feature because in the next tasks, they had no problems using the same icon for a similar task.

Another negative finding of the application is the online shop section that was considered not to be relevant by the majority of users. However, part of the upcoming plans of the company SportyFly Oy. is to offer online premade programs for users who are not under the guidance of a personal trainer. In this sense, this section would be essential for those end users.

6.2. Interpretation of the results

Two main objectives for this thesis work were identified. The first objective was to find the factors that motivate people to use fitness and wellbeing mobile applications. A sub-objective was to find what factors would motivate users to use SportyPlanner app. The second main objective was to provide an overview of which design strategies are the most suitable so that SportyPlanner app motivates its users to continue exercising and thus, to continue using the application.

In order to address these objectives, a fitness mobile application called SportyPlanner app was designed and a high-fidelity prototype was created. This prototype was evaluated by 16 participants who, after testing it, were interviewed in order to better know what their feelings while using it were as well as what aspects motivate them to use fitness and wellbeing applications in general and SportyPlanner app in particular.

Regarding the first main objective, the results were aligned with previous findings in the literature. According to Piloni et al. (2013) the main focus when designing fitness and wellbeing apps should be on creating relationships among users as well as on providing the support of real personal trainers in order to make the workout safer and motivating. In this respect, more than half of the participants agreed that promoting sociability and the creation of users' communities is very motivating in the long term. In addition, all the participants, both end-users and personal trainers, coincided that having the support of a personal trainer is essential in this kind of applications. Moreover, according to Deci et al. (1999) providing an extrinsic motivation in the form of rewarding the user whenever he/she performs a workout is a good motivational tactic to be included. In this regard, all the end-user participants agreed that having a rewarding system would motivate them to continue using a fitness and wellbeing application, especially if the discounts obtained are good enough. Finally, Yoganathan et al. (2015) suggested that persuasive design principles such as self monitoring and customization technologies should be included in the design in order to formulate effective self-regulatory strategies. In relation to this, all the participants stated that having the possibility of following the progress with graphs

and charts as well as being able to adapt and change their own workouts if needed are key factors to be taken into account in this kind of applications.

Concerning the second main objective, results turned out to be in line with previous studies. In order to address this objective, the design strategies included in SportyPlanner app were compared with the model proposed by Ahtinen (2015). In total, 22 out of the 34 design strategies in Ahtinen's model were included in the design of SportyPlanner app. The majority of the not included design strategies were not considered because the actions they represent can be done by the personal trainers for the time being. However, different ideas related to the missing design strategies for future work have been proposed. Furthermore, the researchers of this thesis work have realized that there are some features included in SportyPlanner app which do not belong to any design strategy already defined and thus, three new design strategies have been suggested. First, providing audio and video visualization as well as textual explanations of each of the exercises while doing the workouts is a design strategy that should be taken into account. Second proposed design strategy includes the possibility of allowing users to express their own and personal feelings, perceptions, opinions as well as pictures of any fitness related theme and keeping track of it as a diary. Finally, the last new design strategy proposed consists on allowing the user to edit all the information related to the workouts if he/she needs to.

6.3. Future work

6.3.1. Based on the interview with participants

With the user test many great ideas appeared, from the end user point of view and the personal trainer point of view. These new ideas that might turn into new features could be put to test with another prototype or with an alpha or beta version of the mobile application when the company decides to code and launch it.

One of the elements concerning the future work is to increase the involvement and participation of the personal trainer in the mobile application. The personal trainer should be managing the online shop and deciding what programs are good for each end user. As one of the participants said:

“The personal trainer should be the one managing what programs are available in the shop for me”.

End user, male, 29 years

This means that not all the end users will have the same programs open in the shop because people progress at different rates, which is how it happens in reality. Another thing to consider is to have the possibility to choose the order of the exercises when the end user is in the gym. The reason for this is that sometimes the gym or the place is

crowded and is not feasible to follow the exact same order the personal trainer indicated. Following the same idea, it would be good for the end user to know what machines are similar to the one he/she is supposed to use, giving them more freedom to choose what they want at the moment of working out. And negotiating with the personal trainer the schedule of the workout is also one thing that some of the participants asked for.

Regarding the meal section, both personal trainers and end users were quite happy with it regardless of its areas of improvement. One of the personal trainers interviewed said that:

“Maybe it's good to add a feature for nutrition. For example, I write a nutrition plan for someone, some feature that allows me to know if the customer is following it or not. Not only the picture”.

End user, female, 27 years

An end user said that it would be good to show an estimate of the calories burned on each exercise as well as the calories contained on the meal. The idea behind this is to make the meal section more detailed and complete for both, the personal trainer and the end user.

Concerning the discounts and bonus through the badge system, end users want to include in the possible options massages and body treatments at spas and similar places. This could also expand to have discounts or passes to sports events that tend to be quite expensive. It could be a way to advertise those events as well.

Finally, some of the participants inquired about the possibility to add interaction by sharing a picture with other friends and in this way promote a bit of competition. It is also a way to share some aspects of the workout experience with particular friends and therefore create a sense of community within the app.

6.3.2. Based on design strategies

While evaluating the motivational factors and design strategies used in SportyPlanner app made in section 5.1.2, it was discovered that some of the abovementioned strategies were not included in the first version of the design of the application. Based on those missing design strategies as well as participants' feedback, the researchers of this thesis have analyzed some ideas that can be implemented in future versions of the design.

In dimension 2 or *Be my Advisor*, three of the design strategies were not implemented: *reminding*, *glimpse to the future* and *explicit spur*. Reminding the user about the importance of doing physical activity as well as the future benefits of it is very important and therefore, an idea for the future could be sending notifications to the user when a workout is missed as well as notifications reminding users about the importance of

following the scheduled workouts as well as the health benefits that the user is expected to get if he/she follows them. Moreover, another idea for the future is adding the possibility of the personal trainer giving audio or on-screen spurring messages to their customers via SportyPlanner app.

Furthermore, four design strategies within Dimension 4 or *Utilise my Sociability* were not included in the design of the application: *cooperation and competition*, *re-union*, *role models* and *passing forward*. A possibility to include some sort of competition could be allowing competition with other familiar/known person. However, as explained in more detail in the evaluation results in section 5.4.2, not all the participants found this option very motivating and they would prefer it not to be added. Moreover, as it is possible that a personal trainer has a group of people as one client (e.g. sport teams), the strategies *re-union* and *group formation* could be added in the future so that it could be easier to schedule meetings among the people who belong to the group. Finally, adding the possibility of having a well-known personal trainer who gives encouraging messages and advise (especially for people who use the app without having an own personal trainer) would be a good idea.

Two of the design strategies within Dimension 5 or *Keep Me Engaged* were not contemplated: *surprises* and *levels*. Therefore, two ideas for future work related to these missing design strategies could be to include the possibility of giving the user special rewards (e.g. double amount of badges, special discounts, raffles) based on special circumstances (e.g. festive days, improved progress etc.) as well as to implement a pyramid levels system within the badge punctuation system. With this system, each time the user earns a certain amount of badges, he/she levels up in a pyramid which is divided into levels. When the user reaches each of the levels, he/she can change the badges for discounts.

Finally, *beyond numbers* design strategy included in Dimension 6 or *Visualise My Exercise* is currently included in the design as users can see not only numerical but also graphical information regarding progress, weight and sleeping time. However, a good idea for future design would be to also include more playful visualizations such as classifications between the user's own results or between the user's results.

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APPENDIX 1: Navigation

The appendix contains the navigation diagrams for all the features in SportyPlanner app.

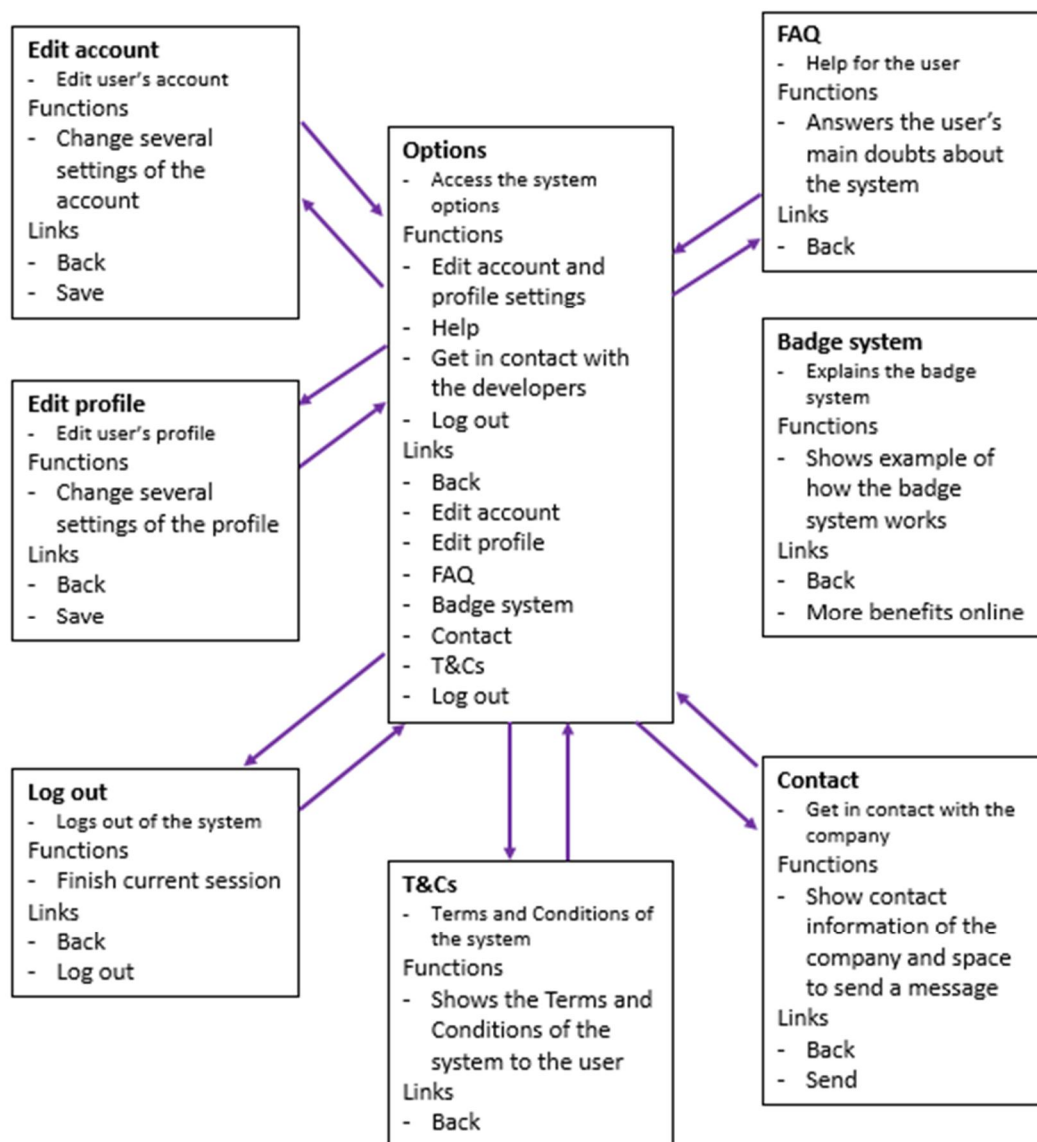


Figure 27. Options inside Options section.

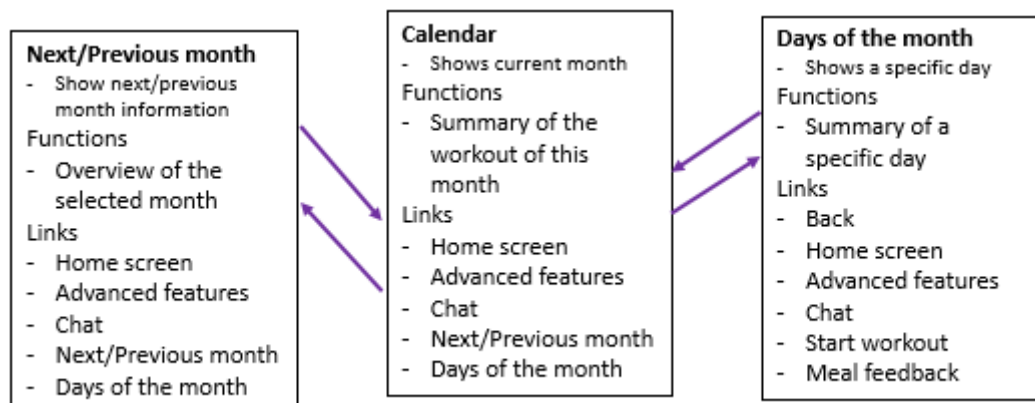


Figure 28. Calendar section.

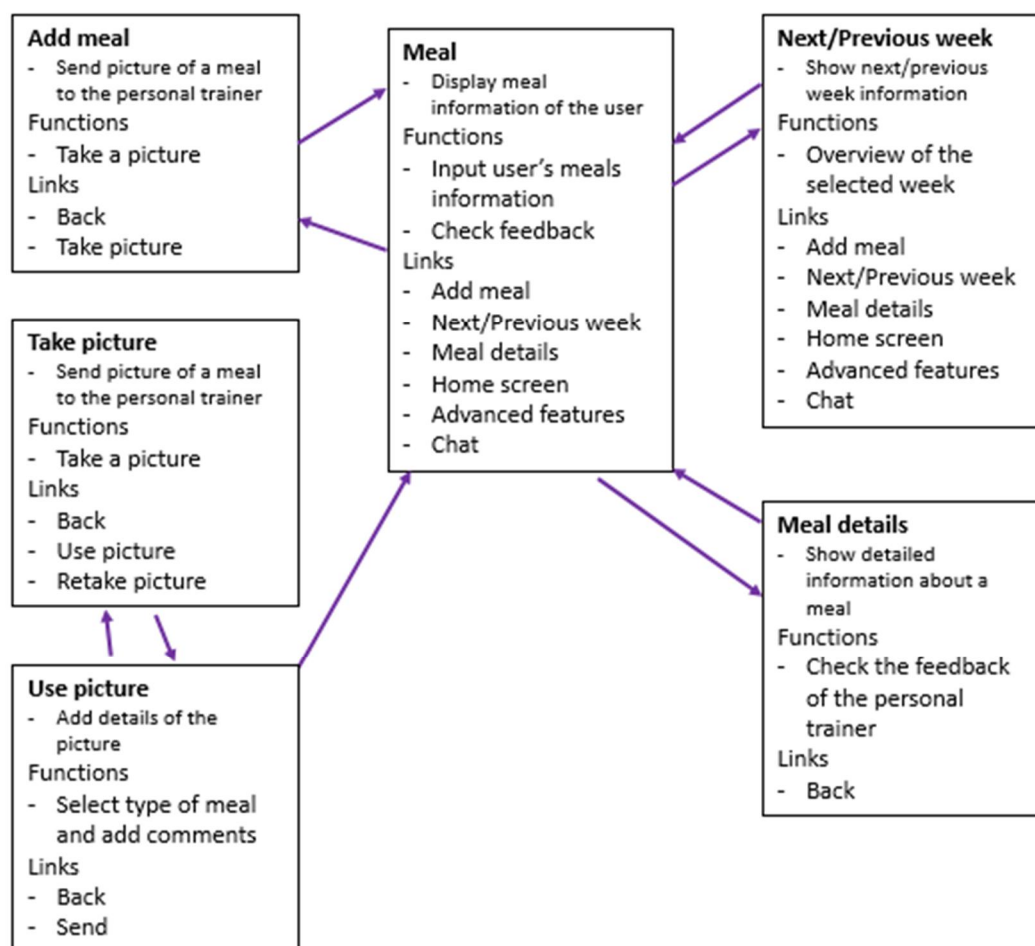


Figure 29. Meals section.

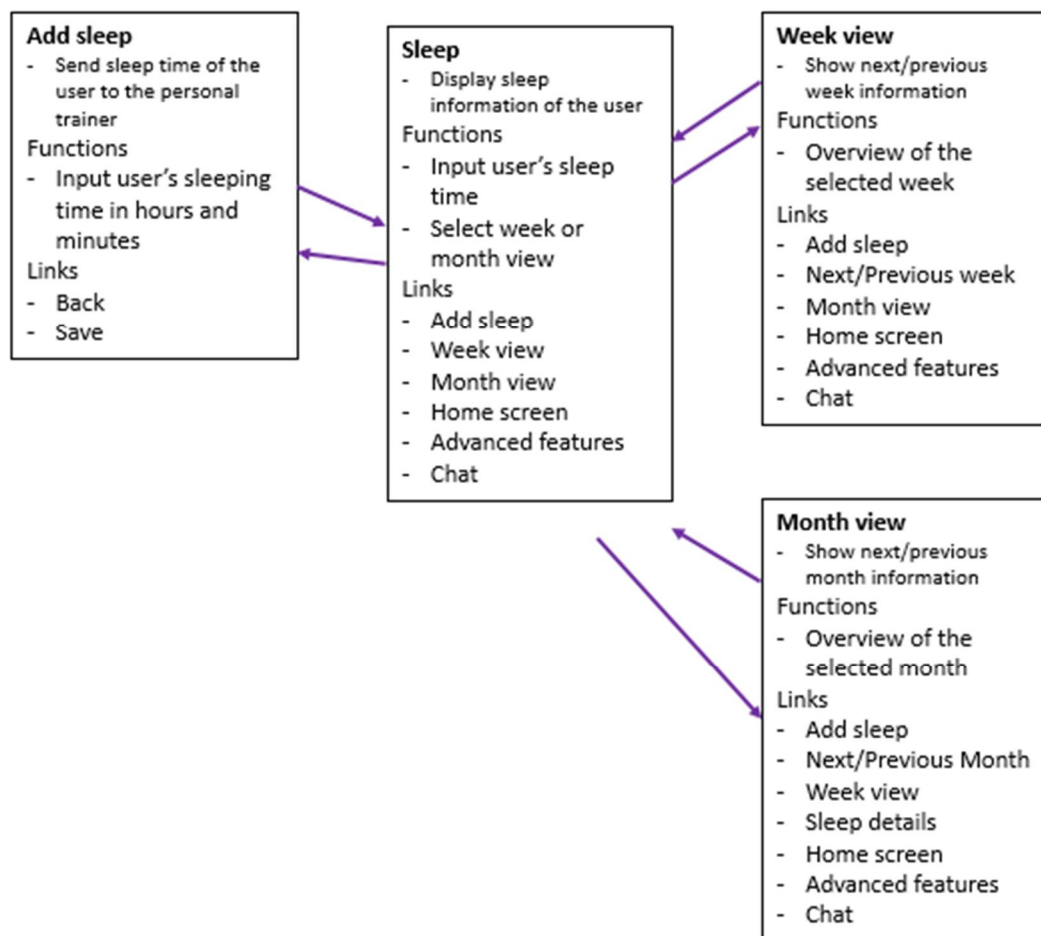


Figure 30. Sleep section.

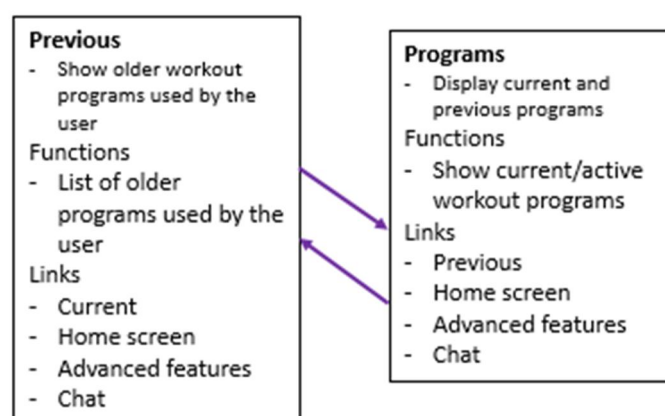


Figure 31. Programs section.

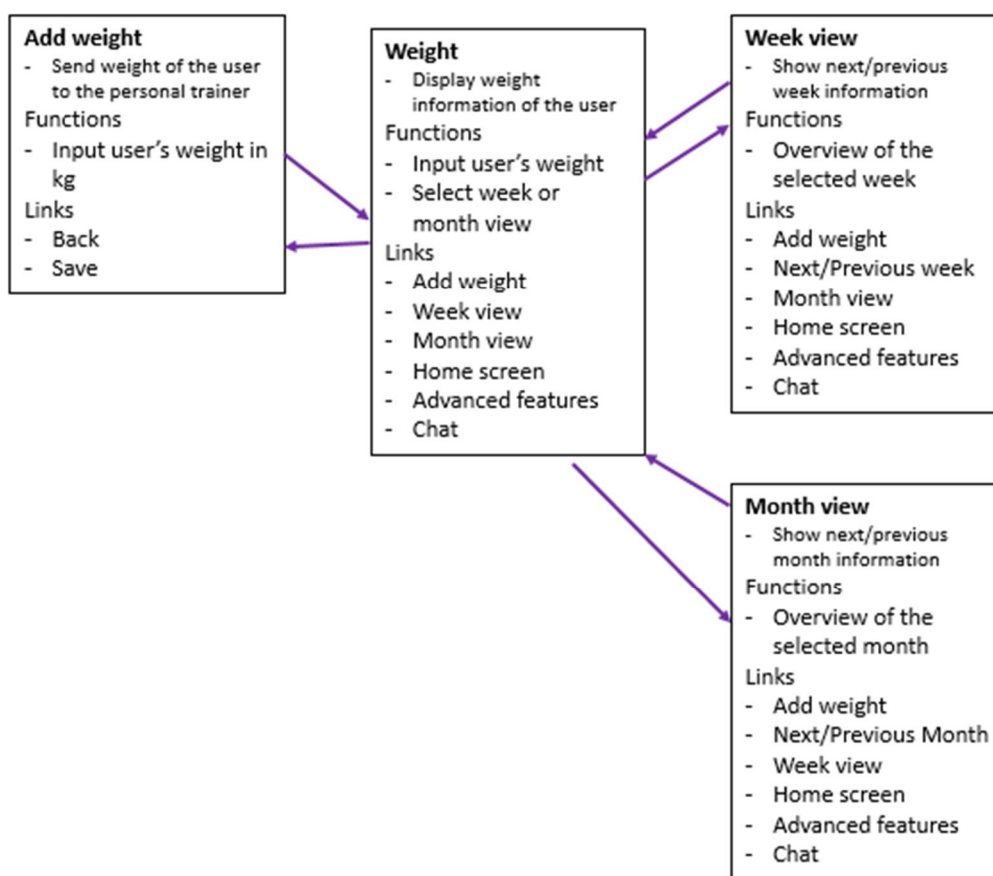


Figure 32. Weight section.

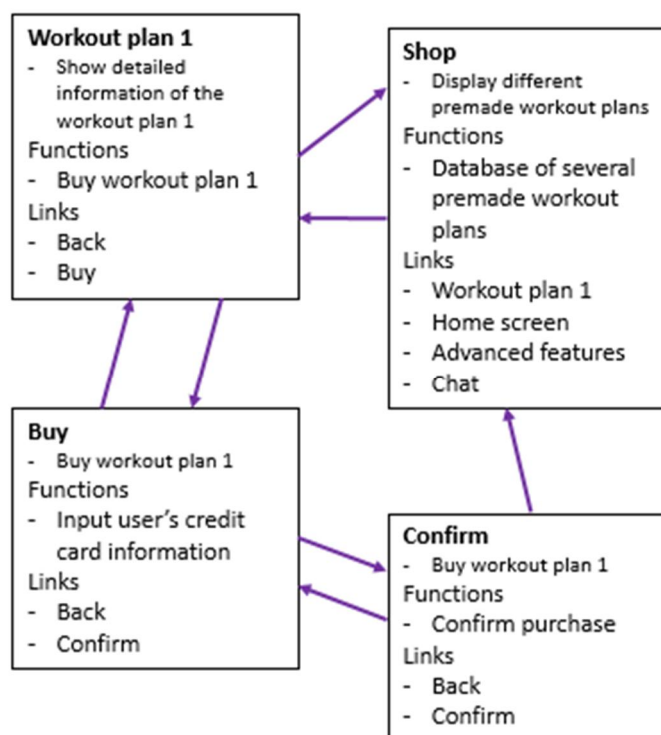


Figure 33. Online shop section.

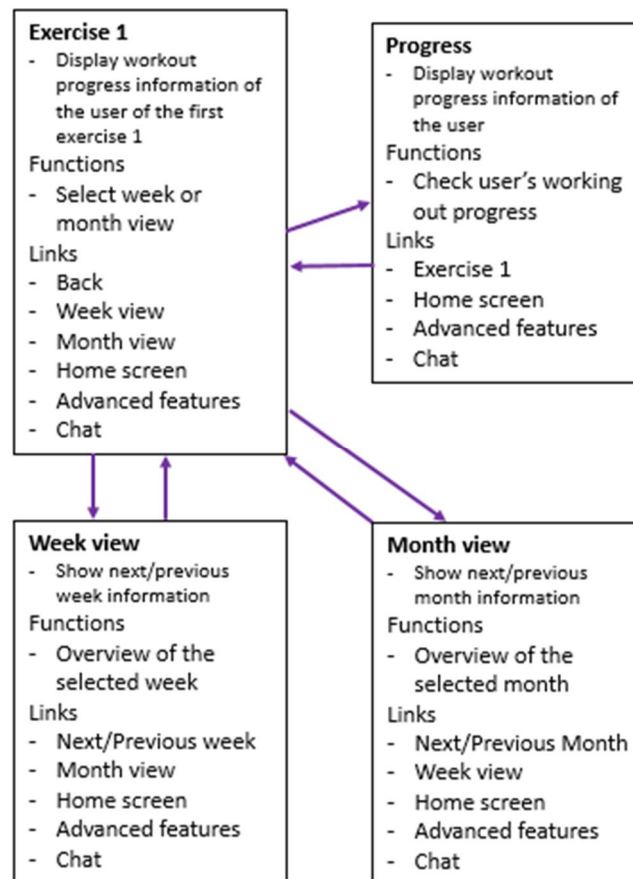


Figure 34. Progress section.

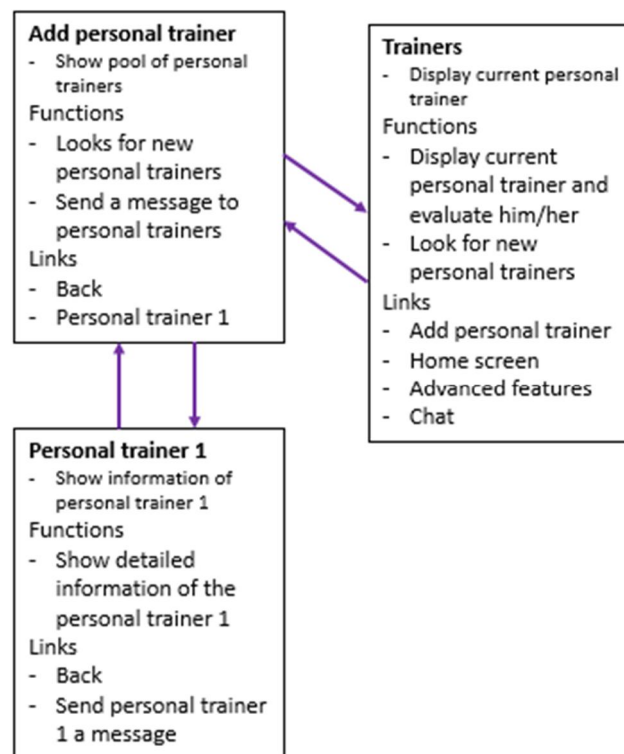


Figure 35. Personal Trainers section.

APPENDIX 2a: Interview questions

Theme 1: General information

- How often do you go to the gym and/or do physical exercise?
- What are your goals when going to the gym?
- Do you use your mobile phone at the gym? (i.e. to listen to music, etc.)
 - If yes:
 - § Do you use any particular app to help you doing the workouts?
 - § What do you like or dislike about this app?
 - If no:
 - § Would you find it useful to use an app that helps you doing and following your workouts?
- When you go to the gym, how do you know you are making progress?
- What are the most common problems you have to track your workout?

Theme 2: Regarding the use of SportyPlanner app

- How was the experience of using SportyPlanner? What kind of feelings did it evoke on you?
- Did you find any feature specially difficult or annoying to use? What was the most difficult task for you to achieve?
- Did you like any particular feature of the app? Why?
- Is there anything you would like to add or remove from the app?

Theme 3: Motivation to use the app

- What do you think was the most motivating feature on SportyPlanner? Why?
- Do you find it useful to have a real personal trainer who designs specific plans for your goals and needs, and who gives you personalized advice? Does it motivate you to use the app?
- What kind of information would you consider more useful to check?
- What do you think about SportyPlanner punctuation system?
- Would you be interested in changing the points you have earned by using the app?
 - If yes:
 - § What products would you be more interested to obtain by using the points: new programs, free sessions with a personal trainer, and discounts vouchers in sport stores?

- Is there any other way (apart from points) that would motivate you to continue using the app?

APPENDIX 2b: Background questionnaire

SportyPlanner App: Usability test

Tampere University of Technology

BACKGROUND QUESTIONNAIRE

Background Information

Age: _____

Gender: ☐ Male ☐ Female

Occupation:

- ☐ Entrepreneur
- ☐ Employer
- ☐ Employee
- ☐ Student
- ☐ Retired
- ☐ Unemployed or on leave

Education:

- ☐ Comprehensive or elementary school
- ☐ High school
- ☐ College / University degree
- ☐ Other (please specify): _____

Smartphone Use

How do you evaluate your smartphone skills?

- ☐ Excellent, I understand how smartphones function
- ☐ Good, I use smartphones often and fluently
- ☐ I can use basic functions such as calling and SMSs
- ☐ I am a novice in smartphones use
- ☐ I don't use smartphones at all

How many hours per day do you use the smartphone?

- ☐ 1-2 hours
- ☐ 2-4 hours
- ☐ 4-7 hours
- ☐ 7+ hours

What kind of apps do you have in your smartphone?

- ☐ Health and fitness
- ☐ Entertainment
- ☐ Music
- ☐ News
- ☐ Education
- ☐ Finance
- ☐ Food
- ☐ Travel
- ☐ Sports
- ☐ Weather
- ☐ Others (please specify) _____

To which purposes do you use your smartphone?

- ☐ Calling and sending SMSs
- ☐ Reading and sending email
- ☐ Electronic shopping
- ☐ Reading the news
- ☐ Socializing (e.g. Instagram, Facebook)
- ☐ Entertainment (Gaming, watch movies, etc.)
- ☐ Listen to music

APPENDIX 2c: User satisfaction questionnaire

SportyPlanner App: Usability test

Tampere University of Technology

USER SATISFACTION QUESTIONNAIRE

Evaluate the following statements by checking the correct answer.	Strongly disagree	Disagree	I don't know	Agree	Strongly Agree
The contents of the app were important to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was difficult to understand the structure of the app.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The appearance of the app was pleasant.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The home screen of the app was easy to understand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moving from one section to another was easy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of the app was fluent.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I always knew my location in the app.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I understood how to track my workout easily.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was satisfied with the ease of use of the app.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was easy to perform the given tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The app included terms and words that were unfamiliar to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using the app was frustrating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I'm going to use the app later.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your participation.
Your answers will be kept confidential.